

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

ACCREDITED BY NAAC WITH 'A++' GRADE

Ibrahimbagh, Hyderabad-31

Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

**Sponsored
by
VASAVI ACADEMY OF EDUCATION
Hyderabad**



**SCHEME OF INSTRUCTION AND SYLLABI UNDER CBCS FOR
B.E. CSE (AIML) III and IV Semesters
With effect from 2025-26
(For the batch admitted in 2025-26)
(R-25)**



**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Phones: +91-40-23146020, 23146021
Fax: +91-40-23146090**

Institute Vision

Striving for a symbiosis of technological excellence and human values

Institute Mission

To arm young brains with competitive technology and nurture holistic development of the individuals for a better tomorrow

Department Vision

To be a center for academic excellence in the field of Computer Science and Engineering education to enable graduates to be ethical and competent professionals

Department Mission

To enable students to develop logic and problem solving approach that will help build their careers in the innovative field of computing and provide creative solutions for the benefit of society.

B.E (CSE) Program Educational Objectives (PEO's)

Graduates should be able to utilize the knowledge gained from their academic program to:

PEO I	Solve problems in a modern technological society as valuable and productive engineers.
PEO II	Function and communicate effectively, both individually and within multidisciplinary teams.
PEO III	Be sensitive to the consequences of their work, both ethically and professionally, for productive professional careers.
PEO IV	Continue the process of life-long learning.

B.E. (CSE) PROGRAM OUTCOMES (PO's)	
Engineering Graduates will be able to:	
PO1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
P10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
P11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
P12	Lifelong learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

B.E (CSE) PROGRAM SPECIFIC OUTCOMES (PSO's)	
PSO I	Graduates will have knowledge of programming and designing algorithms to develop solutions for engineering problems pertaining to AI&ML.
PSO II	Graduates will be able to develop models in Machine Learning, Deep Learning using knowledge of AI and modern tools.
PSO III	Graduates will apply AI&ML techniques for real world applications in the areas of Cyber Security, Image processing, Natural Language Processing and IoT

B.E CSE(AIML) III Semester								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
THEORY								
UII25PC310CS	Data Structures	3	1	-	3	60	40	4
UII25PC320CS	Object Oriented Programming through Java	3	-	-	3	60	40	3
UII25PC330CS	Computer Architecture	3	-	-	3	60	40	3
U25BS350MA	Probability Distributions & Inference Theory	3	1	-	3	60	40	4
U25OE3XXXX	Open Elective-I	2	-	-	3	60	40	2
U25HSXXXEH	Critical Thinking	1	-	-	2	40	30	1
U25HS030EH	Human Values and Professional Ethics-II	1	-	-	2	40	30	1
U25HS320EH	Skill Development Course- III (Communication Skills-I)	1	-	-	2	40	30	1
UII25PE310CS	Skill Development Course- IV (Technical Skills-III)	1	-	-	2	40	30	1
PRACTICALS								
UII25PC311CS	Data Structures Lab	-	-	2	3	50	30	1
UII25PC321CS	Object Oriented Programming through Java Lab	-	-	2	3	50	30	1
Library / Sports / Mentor Interaction		-	-	-	-	-	-	-
Extra-Curricular Activities –I		-	-	-	-	-	-	-
TOTAL		18	2	4	-	560	380	22
GRAND TOTAL		24				940		
Student should acquire one NPTEL course certification of 8 weeks duration (2 credits) during I Sem to VI Sem								

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Department of Computer Science & Engineering

DATA STRUCTURES

SYLLABUS FOR B.E. III-SEMESTER

L:T:P (Hrs./week):3:1:0	SEE Marks: 60	Course Code: UII25PC310CS
Credits : 4	CIE Marks :40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1 Identify and use appropriate data structure for a given problem with effective utilization of space and time. 2 Describe the linear and nonlinear data structures. Analyze the complexities of different sorting techniques.	1 Compute time and space complexities of Algorithms. Design a solution to a given problem using arrays. 2 Develop applications using stacks, queues and linked lists. 3 Choose the appropriate nonlinear data structure and perform operations on them. 4 Choose suitable sorting technique to maximize the performance of the solution. Select the hashing technique to perform dictionary operations. 5 Explain operations on Multiway Search Trees and Graphs.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1	1									3		
CO2	3	3	2	1					1			1	3	2	
CO3	3	3	2	1					1			1	3	2	
CO4	2	2	2	1					1			1	2	1	
CO5	2	2	2	1					1				2	1	

UNIT-I:

Basic concepts: Algorithm Specification- Introduction, Recursive algorithms, Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations. **Arrays:** Arrays - ADT, Polynomials, Sparse matrices, Strings-ADT, Pattern Matching.

UNIT-II:

Stacks and Queues: Stacks, Stacks using dynamic arrays, Queues, Circular Queues using dynamic arrays, A Mazing Problem, Evaluation of Expressions – Evaluating Postfix Expression, Infix to Postfix.

Linked Lists: Singly Linked Lists and Chains, Linked Stacks and Queues, Polynomials, Operations for Circularly linked lists, Sparse matrices, Doubly Linked Lists.

UNIT-III:

Trees: Introduction, Binary Trees, Binary Tree Traversals, Heaps, Binary Search trees (BST): Definition, Searching a BST, Insertion into a BST, Deletion from a BST.

Efficient Binary Search Trees: AVL Trees, Splay Trees.

UNIT-IV:

Sorting: Insertion Sort, Quick sort, Merge sort, Heap sort, Radix Sort, Sorting on Several Keys.

Hashing: Introduction, Static Hashing: Hash tables, Hash functions, Overflow handling.

UNIT-V:

Multiway Search Trees: m-way search trees-Definition and properties, Searching an m-way search tree, B-Trees-Definition and properties, Number of Elements in a B-Tree, Insertion into a B-Tree and Deletion from a B-Tree. **Trie Data**

Structure: Introduction, Basic Operations.

Graphs: The Graph ADT, Elementary graph operations, Minimum Cost Spanning Trees- Kruskal's Algorithm, Prim's Algorithm.

Learning Resources:

1. Horowitz E, Sahni S and Susan Anderson-Freed, Fundamentals of Data structures in C, 2nd Edition(2008), Universities Press.
2. Mark A Weiss, Data Structures and Algorithm Analysis In C, 2nd Edition (2002), Pearson.
3. Kushwaha D. S and Misra A.K, Data Structures A Programming Approach with C, Second Edition(2014), PHI.,
4. Gilberg R. F and Forouzan B. A, Data Structures: A Pseudocode Approach with C, Second Edition(2007), Cengage Learning
5. Tanenbaum A. M ,Langsam Y. Augenstein M. J, Data Structures using C, Second Edition (2008), Pearson.
6. Thomas H. Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein, Introduction to Algorithms, Third Edition(2009), MIT Press
7. Yedidyah Langsam , Moshe J. Augenstein ,Aaron M. Tenenbaum, Data Structures Using C and C++ , Second Edition(2009), PHI
8. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/lecture-videos>
9. <http://nptel.ac.in/courses/106106127/>
10. <http://www.nptel.ac.in/courses/106102064>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1 No. of Internal Tests : Max. Marks for each Internal Test :

2 No. of Assignments : Max. Marks for each Assignment :

3 No. of Quizzes : Max. Marks for each Quiz Test :

Duration of Internal Tests : 1 Hour 30 Minutes

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OBJECT ORIENTED PROGRAMMING THROUGH JAVA

SYLLABUS FOR B.E. III-SEMESTER

L:T:P(Hrs./week): 3:0:0	SEE Marks:60	Course Code: UII25PC320CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	<i>On completion of the course, students will be able to</i>
1 Apply object oriented principles to develop applications using Java constructs.	1 Apply object oriented programming concepts to solve a problem 2 Employ exception handling, concurrent programming practices to develop a parallel processing application 3 Perform I/O operations to develop an interactive Java application. 4 Design a Java utility using the collection framework 5 Apply functional programming constructs and understand a large scale project development architecture style.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	2	3									3		
CO2	2	3	3	3	2								3	2	
CO3	2	3	3	3	2								3	2	
CO4	2	3	3	3	2								3	2	
CO5	2	3	3	3	2								3	2	1

UNIT-I:

Object Oriented System Development: Understanding Object Oriented Development, Understanding Object Concepts, Benefits of Object Oriented Development.

Java Programming Fundamentals: Introduction, Overview of Java, JVM Architecture, Data types, Variables and Arrays, Operators, Control Statements, Classes and Methods, Garbage Collection, this keyword, final, Inheritance, Method Overriding.

UNIT-II:

Classes and Interfaces: Singleton class, Abstract class, Nested class, Interface, Package.

Exception Handling: Introduction, types of exceptions, syntax of exception handling code, multiple catch statements, using finally statement, user-defined exceptions.

Multithreaded Programming: Introduction to threads, creating threads, extending the Thread class, implementing the Runnable interface, life cycle of a thread, priority of a thread, synchronization, and Inter-thread Communication, Deadlock.

UNIT-III:

StringHandling: String, StringBuffer and StringBuilder

Java.lang: Type Wrapper, Process, Runtime, Object class, Generics

IO:Java I/O Classes and Interfaces, Files and Directories, Byte and Character Streams, Serialization.

UNIT-IV: Collections:

Introduction to Collection: Interfaces, Collection Classes, Iterators, List, Set, Maps, Comparator, Arrays.

Legacy Classes and Interfaces, StringTokenizer, BitSet, Date, Calendar, Random, Flow, Timer.

UNIT-V:

Lambda expressions: Expressions, Functions, lambda as argument

Stream API: Basics, Filter, Sort, Map, Collect

Regular Expressions: Pattern, Matcher, Regular expression Syntax

JAVA Beans: Architecture

Learning Resources:

1. Herbert Schildt, Java: The Complete Reference, 12th Edition, Tata McGraw Hill 2021.
2. Joshua Bloch, Effective Java, 3rd Edition, Pearson, 2017
3. Timothy Budd, An introduction to Object-Oriented Programming, 3rd Edition, Pearson Education, 2008
4. Eric Freeman, Bert Bates, Kathy Sierra , Head First Design Patterns: A Brain-Friendly Guide, 1st Edition, O'Reilly, 2016
5. P.RadhaKrishna, Object Oriented Programming through Java, UniversitiesPress,2007.
6. Sachin Malhotra, Saurabh Choudhary, Programming in Java, 2nd Edition, Oxford Press, 2014.
7. <https://docs.oracle.com/javase/tutorial/java>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		:	1 Hour 30 Minutes			

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Department of Computer Science & Engineering

COMPUTER ARCHITECTURE

SYLLABUS FOR B.E. III-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: UII25PC330CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
Students should be able to	At the end of the course, students will be able to
1. Learn the structure and behavior of various functional modules of a computer and identify how they interact to provide the processing needs of the user. 2. Understand memory hierarchy and analyze different ways of communicating with I/O of digital computer and how GPUs achieve high-performance parallel processing compared to conventional CPU architectures	1. Analyze the major components of a computer and design basic hardware for functional modules of digital computer. 2. Analyze micro programmed control unit for designing a digital computer. 3. Apply pipeline concepts to increase computational speed of CPU and analyze the flow of data and instructions in the CPU operations. 4. Analyze techniques used by a computer to communicate with I/O devices. Evaluate the memory organization techniques and Compare GPU architectural components, execution model, and memory hierarchy with conventional CPU architectures

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2											2	
CO2	3	1	1											2	
CO3	2		2											1	
CO4	2		1									1		1	
CO5	2		1									1		1	

UNIT-I

Overview of Computer Function and Interconnection: Computer Components, Interconnection Structures, Bus Interconnection, Bus Structure, Data Transfer.

Register Transfer Micro operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic, Logic, Shift Micro operations, Arithmetic Logic Shift Unit.

UNIT-II

Basic Computer organization and Design: Instruction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instruction, Input-Output and Interrupt.

Micro programmed Control: Control memory, Address Sequencing, Micro program Example, Design of Control Unit.

UNIT-III

Central Processing Unit: General Register organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC.

Pipeline: Parallel processing, Pipelining, Arithmetic pipeline, Instruction Pipeline.

Computer Arithmetic: Addition and Subtraction, Multiplication, Division, Floating Point Arithmetic Operations.

UNIT-IV

Input-Output organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor (IOP).

UNIT-V

Memory Organization: Memory Hierarchy, Main Memory, RAM and ROM, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

GPU Architecture and GPU Memory Hierarchy Evolution of GPU Computing, CPU vs GPU Architecture, Registers, Shared Memory, Global Memory

Suggested Books:

1. M.Morris Mano, Computer System Architecture, 3rd Edition (2007), Pearson Education Asia.
2. Programming Massively Parallel Processors: A Hands-on Approach
Authors: Wen-mei W. Hwu, David B. Kirk, and Izzat 4th Edition, Morgan Kaufmann.

Reference Books:

1. William Stallings, Computer Organization & Architecture, 8th Edition (2011), Pearson Education Asia.
2. David A Patterson, John L Hennessy, Computer Organization and Design, 4th Edition (2014), Morgan Kaufmann.
3. Carl.V Hamacher, Vranesic Z.G, Zaky S.G, Computer Organization, 5th Edition (2011), McGraw Hill.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

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DEPARTMENT OF MATHEMATICS

PROBABILITY DISTRIBUTIONS & INFERENCE THEORY

SYLLABUS FOR B.E. III-SEMESTER

L :T:P(Hrs/week): 3:1:0	SEE Marks :60	Course Code: U25BS350MA
Credits :4	CIE Marks :40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
<i>The course will enable the students to:</i>	<i>At the end of the course students will be able to:</i>
1. Study the fundamental concepts of probability theory. 2. Understand random variables and its probability distributions. 3. Learn various probability distributions and their related applications. 4. Study the concept of hypothesis testing employed for large samples. 5. Study the various methods of testing small samples.	1. Define probability and compute probabilities of events and apply Bayes' Theorem to update probabilities based on new information. 2. Differentiate between discrete and continuous random variables and its distributions. 3. Apply various theoretical probability distributions to solve related problems in various applications. 4. Formulate Null and Alternative Hypotheses and apply the tests of hypothesis for large samples. 5. Apply various methods for Tests of Significance for small samples.

[illegible]

UNIT –I (08 Hours)

PROBABILITY

Basic terminology- Definition of Probability – Addition Law of probability- Independent events- Conditional Probability- Multiplication law of probability - Baye's Theorem- related problems.

UNIT –II (08 Hours)

RANDOM VARIABLES AND DISTRIBUTIONS

Random Variables - Discrete and Continuous Random Variables – Mass and density functions – Distribution functions - Definitions of Mean, Median, Mode and Variance of Probability distributions.

UNIT-III (08 Hours)

THEORETICAL DISTRIBUTIONS

Binomial & Poisson distributions & Normal Distribution- Properties-related problems

UNIT-IV (08 Hours)

TESTS OF HYPOTHESIS FOR LARGE SAMPLES

Introduction -Testing of Hypothesis- Null and Alternative Hypothesis -Errors- -Level of Significance –Confidence Intervals - One and two tailed tests - Tests of Significance for large samples – Tests for single mean- Difference of means.

UNIT -V (08 Hours)

TESTS OF HYPOTHESIS FOR SMALL SAMPLES

Tests of Significance for small samples - t-test for single mean and difference of means – F- test for comparison of variances - Chi-square test for goodness of fit.

Text Books:

1. Advanced Engineering Mathematics, Third Edition, R. K. Jain and S. R. K. Iyengar, Narosa Publishing House.
2. Higher Engineering Mathematics, Dr.B.S. S Grewal 40th Edition, Khanna Publishers.
3. Probability & Statistics and Random Process, Third edition, T Veerarajan, Tata McGraw-Hill publishing limited.

Reference Books:

1. Miller & Freund's Probability And Statistics For Engineers, Ninth Edition, Richard A. Johnson, Pearson publishers.
2. A text book of Engineering Mathematics by N.P. Bali & Manish Goyal, Laxmi Publication.

3. Fundamentals of Mathematical Statistics, Gupta & Kapoor, Sultan chand & sons, New Delhi.
4. Probability & Statistics for Engineers, Antony J. Hayter, CENGAGE Learning.

Online Resources:

https://onlinecourses.nptel.ac.in/noc25_ma39/preview

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

OPEN ELECTIVES OFFERED IN B.E. III SEMESTER (2026-27)

Dept	Title (Open Elective-I)	Code	Credits
CIVIL	Green Buildings	U25OE310CE	2
ECE	Mathematical Programming for Engineers (General Pool)	U25OE310EC	2
	Introduction to Signals and Systems (General Pool)	U25OE320EC	2
	Introduction to Signals and Systems (Communication Engineering-Stream)	U25OE340EC	2
EEE	Non Conventional Energy Sources	U25OE310EE	2
Mech.	Introduction to Industrial Robotics (Stream: Robotics)	U25OE310ME	2
	Fundamentals of Unmanned Aerial Vehicles (General Pool)	U25OE320ME	2
Chem.	Corrosion Science and Technology	U26OE310CH	2
H & SS	Human Resource Management for Engineers (Management Courses for Engineers – Stream)	U25OE310EH	2
	Financial Services (BFSI Stream)	U25OE350EH	2
	Political Science (Liberal Arts Courses – Stream)	U25OE370EH	2
	Constitution of India (General Pool)	U25OE360EH	2
	Fundamentals of Entrepreneurship (Stream: Entrepreneurship)	U25OE310EH	2
Physics	Fundamentals of Smart Materials and Applications (FSMA)	U25OE310PH	2
Maths	Number Theory & Boolean Algebra	U25OE310MA	2

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DEPARTMENT OF CIVIL ENGINEERING

GREEN BUILDINGS (Open Elective-I)

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):2:0:0	SEE Marks:60	Course Code: U25OE310CE
Credits: 2	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	Upon the completion of this course the students will be expected to:
1. Learn the principles of planning and orientation of buildings. 2. Environmental implications of natural and building materials along with green cover 3. Acquire knowledge on various aspects of green buildings	1. Explain the principles of building planning, its bylaws and provide facilities for rainwater harvesting. 2. Analyse the aspects of energy, water and waste management in buildings. 3. Understand the concepts of green building technologies. 4. Understand rating systems of GRIHA IGBC and LEED.

CO-PO and CO-PSO mapping												
CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2		2			2	2					2
CO2						2	3					
CO3	2						3					2
CO4	2						3					

UNIT-I: Planning of buildings: Principles of planning, Relevant building bylaws, site selection for buildings, orientation of buildings, Provision of rain water harvesting

UNIT-II: Building-Energy-Implications: Environmental implications of buildings energy, carbon emissions, water use, waste disposal; Building materials: sources, methods of production and environmental Implications. Green building materials and recycling, Green cover and built environment

UNIT-III: Green Building Technologies:Introduction- Necessity - Concept of Green building. Principles of green building – Site selection criteria for Green Buildings – effective cooling and heating systems – effective electrical systems-Passive solar architecture - effective water conservation systems

UNIT-IV: Certification Systems: Certification systems- Green Rating for Integrated Habitat Assessment (GRIHA), Indian Green Building Council (IGBC) and Leadership in Energy and Environmental Design (LEED), case studies

Learning Resources:

1. Kumara Swamy N.Kameswara Rao A., Building Planning And Drawing, Charotar, Publications, 2013.
2. Shahane, V. S, "Planning and Designing Building", Poona, Allies Book Stall, 2004.
3. Michael Bauer, Peter Möslle and Michael Schwarz "Green Building – Guidebook for Sustainable Architecture" Springer, 2010.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison "Green Building Handbook" Volume I, Spon Press, 2001.
5. Mili Majumdar, "Energy-efficient buildings in India" Tata Energy Research Institute, 2002.
6. TERI "Sustainable Building Design Manual- Volume I & II" Tata Energy Research Institute, 2009.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5
	Duration of Internal Tests	:		90 Minutes		

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Mathematical Programming for Engineers
(General Pool: Open Elective - I)

SYLLABUS FOR B.E. III – SEMESTER (Civil, CSE, AIML, EEE, IT, Mechanical)

L:T:P (Hrs./week) : 2:0:0	SEE Marks : 60	Course Code: U25OE310EC
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introduce the basic environment and interface of MATLAB, including its windows, file types, and built-in help system. 2. To develop proficiency in MATLAB basics such as variables, arrays, vectors, matrices, and script/function file creation and execution. 3. To build programming skills using MATLAB, including understanding data types, control structures, loops, and debugging techniques. 4. To enable students to generate 2D and 3D plots and visualizations, using MATLAB's wide range of graphic functions and solving mathematical and engineering problems such as numerical integration, linear algebra, interpolation, and root finding.	On completion of the course, students will be able to 1. Demonstrate familiarity with the MATLAB environment, file handling, and basic operations including help utilities. 2. Create and manipulate matrices, vectors, and arrays using built-in functions and scripts in MATLAB. 3. Write and debug MATLAB programs using control structures, loops, and logical operations. 4. Generate and customize 2D and 3D plots for data visualization and analysis and solve mathematical problems using MATLAB, including linear and nonlinear equations, interpolation, differentiation, and numerical integration.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1			3									2	3
CO2		2			3									2	3
CO3	1	1	2	2	3									2	3
CO4	1	2			3									2	3

UNIT - I : Introduction:

Basics of MATLAB, MATLAB windows, Advantages of MATLAB, on-line help, file types.

MATLAB Basics: Variables and Constants – Vectors and Matrices- Arrays - manipulation- Built-in MATLAB Functions. Creating and printing simple plots, Creating, Saving and Executing a Script File, Creating and Executing a function file.

Programming Basics: Data types-Operators – Hierarchy of operations, Relational

and logical operators, if-end structure, if-else-end structure, if-elseif-else-end structure, switch-case statement, for-end loop, while-end loop, break and continue commands.

UNIT - II : Scripts and Functions

Script Files, Function Files, Debugging methods in MATLAB.

Graphics: Basic 2D plots: Printing labels- grid and axes box- Entering text in a box- Axis control-Style options-Multiple plots-subplots-specialized 2D plots: stem-, bar, hist, pi, stairs, loglog, semilog, polar, comet 3D plots: Mesh, Contour, Surf, Stem3, ezplot.

UNIT - III : Numerical Methods Using MATLAB

Numerical Differentiation, Numerical integration- Newton-Cotes integration formulae, Multi-step application of Trapezoidal rule, MATLAB functions for integration.

Linear Equations- Linear algebra in MATLAB, Solving a linear system, Gauss Elimination, Finding eigen values and eigen vectors, Matrix factorizations.

UNIT - IV : Nonlinear Equations

System of Non-linear equations, Solving System of Equations Using MATLAB function fsolve, Interpolation-Lagrange Interpolation, Two dimensional Interpolation.

Solution of Ordinary differential Equations (ODEs)-ODE Solvers in MATLAB, Solving First-order equations using ODE23 and ODE45.

Learning Resources:

1. Getting started with MATLAB "A quick introduction for scientist and engineers by Rudra Pratap, Oxford publications.
2. Advanced Guide to MATLAB-Practical Examples in Science and Engineering by S.N.Alam, S.Islam, S.K. Patel-I.K. International Publishing House Pvt. Ltd.
3. Stephen J. Chapman-"MATLAB Programming for Engineers"- 5th Edition- Cengage Learning- 2015. Getting started with MATLAB (Version 9) The Math works.
4. An Introduction to MATLAB® Programming and Numerical Methods for Engineers 1st Edition by Timmy Siauwx Alexandre Bayen, Elsevier-18th April 2014.
5. <https://nptel.ac.in/courses/103106118/2>
6. <https://www.udemy.com/numerical-methods/>

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 2	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 2	Max. Marks for each Quiz Test	: 5

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Introduction to Signals and Systems

(General Pool: Open Elective - I)

SYLLABUS FOR B.E. III – SEMESTER (CSE, AI&ML & IT branches)

L:T:P (Hrs./week) : 2:0:0	SEE Marks : 60	Course Code: U25OE320EC
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To define and classify continuous time signals and systems. 2. To determine frequency domain characteristics of a signal with Fourier series and Fourier transform. 3. Understand Laplace transform and their properties for analysis of signals and systems. 4. To characterize discrete time signals and systems	On completion of the course, students will be able to 1. Analyze basic signals and systems in continuous time domain. 2. Apply the properties of Fourier transformation techniques to analyze continuous time domain signals and systems in frequency domain. 3. Apply Laplace Transform, analyze the LTI systems. 4. Analyze basic signals and systems in discrete time domain

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3													2
CO2	3	3													2
CO3	3	3													2
CO4	3	2													2

UNIT - I

Continuous time signals: types of signals, representation of signals, basic elementary signals, operations on signals.

Continuous time systems: classification of systems - static and dynamic, linear and non linear, time invariant and time variant.

UNIT - II

Continuous time Fourier Series: Introduction, existence, properties, magnitude and phase spectrums

Continuous time Fourier transforms: Introduction, existence, properties, magnitude and phase spectrums.

UNIT – III

Laplace transforms: Introduction, existence, Laplace transform of basic elementary signals, properties, inverse Laplace transforms, Analysis of LTI systems using Laplace Transform.

UNIT - IV

Discrete time signals: types of signals, representation of signals, basic elementary signals, operations on signals.

Discrete time systems: classification of systems - static and dynamic, linear and non linear, time invariant and time variant.

Learning Resources:

1. P. Ramakrishna Rao, Signals and Systems, Mc Graw Hill, 2008.
2. Alan V. Oppenheim, Alan S. Wilsky and S. Hamid Nawab, Signals and Systems, 2nd ed., PHI, 2009.
3. Nagoor kani , Signals and Systems McGraw Hill, 2013
4. https://onlinecourses.nptel.ac.in/noc19_ee07/preview
(Principle of Signals and Systems by Prof. Aditya K Jagannatham)
5. <https://www.edx.org/course/signals-and-systems-part-1-1>
6. <https://www.edx.org/course/signals-systems-part-2-iitbombayx-ee210-2x-3>

The break-up of CIE : Internal Tests + Assignments + Quizzes

- | | | | | | |
|--------------------------|---|--------------------------------|------------------------------------|---|---------------------------------|
| 1. No. of Internal Tests | : | <input type="text" value="2"/> | Max. Marks for each Internal Tests | : | <input type="text" value="30"/> |
| 2. No. of Assignments | : | <input type="text" value="2"/> | Max. Marks for each Assignment | : | <input type="text" value="5"/> |
| 3. No. of Quizzes | : | <input type="text" value="2"/> | Max. Marks for each Quiz Test | : | <input type="text" value="5"/> |

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Introduction to Signals and Systems

(Communication Engineering Stream: Open Elective - I)

SYLLABUS FOR B.E. III – SEMESTER (CSE, AIML & IT branches)

L:T:P (Hrs./week) : 2:0:0	SEE Marks : 60	Course Code: U25OE340EC
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To define and classify continuous time signals and systems. 2. To determine frequency domain characteristics of a signal with Fourier series and Fourier transform. 3. Understand Laplace transform and their properties for analysis of signals and systems. 4. To characterize discrete time signals and systems	On completion of the course, students will be able to 1. Analyze basic signals and systems in continuous time domain. 2. Apply the Fourier analysis to analyze continuous time domain signals and systems in frequency domain. 3. Apply Laplace Transform, analyze the LTI systems. 4. Analyze basic signals and systems in discrete time domain

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3			3								1		2
CO2	3	3			3										2
CO3	3	3			3										2
CO4	3	2			3								1		2

UNIT - I

Continuous time signals: types of signals, representation of signals, basic elementary signals, operations on signals.

Continuous time systems: classification of systems - static and dynamic, linear and non linear, time invariant and time variant.

Lab Activity: Generation of elementary signals in MATLAB.

UNIT - II

Continuous time Fourier Series: Introduction, existence, properties, magnitude and phase spectrums

Continuous time Fourier transforms: Introduction, existence, properties, magnitude and phase spectrums.

Lab Activity: Verification of properties of Fourier Transform in MATLAB.

UNIT – III

Laplace transforms: Introduction, existence, Laplace transform of basic elementary signals, properties, inverse Laplace transforms, Analysis of LTI systems using Laplace Transform.

Lab activity: Obtaining system response using Laplace transforms in MATLAB

UNIT - IV

Discrete time signals: types of signals, representation of signals, basic elementary signals, operations on signals.

Discrete time systems: classification of systems - static and dynamic, linear and non linear, time invariant and time variant.

Lab activity: Generation of elementary signals in MATLAB.

Learning Resources:

1. P. Ramakrishna Rao, Signals and Systems, Mc Graw Hill, 2008.
2. Alan V. Oppenheim, Alan S. Wilsky and S. Hamid Nawab, Signals and Systems, 2nd ed., PHI, 2009.
3. Nagoor kani , Signals and Systems McGraw Hill, 2013
4. https://onlinecourses.nptel.ac.in/noc19_ee07/preview
(Principle of Signals and Systems by Prof. Aditya K Jagannatham)
5. <https://www.edx.org/course/signals-and-systems-part-1-1>
6. <https://www.edx.org/course/signals-systems-part-2-iitbombayx-ee210-2x-3>

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2. No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3. No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS
ENGINEERING**

NON CONVENTIONAL ENERGY SOURCES

(Open Elective-I)

SYLLABUS FOR B.E. III SEMESTER

L:T:P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U25OE310EE
Credits:2	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	On completion of the course, students will be able to
To provide a survey of the most important renewable energy resources and the technologies for harnessing these resources within the framework of a broad range of simple to state-of-the-art energy systems.	1. Demonstrate the generation of electricity from various Non-Conventional sources of energy and solar power generation 2. Illustrate the generation of energy from wind and generation of energy from waste 3. Demonstrate the generation of energy by biomass and fuel cells 4. Illustrate the ocean and geo thermal energy generation

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

UNIT-I: Introduction and Solar Energy:

Introduction: Need for Non-conventional energy sources, Types of Non-Conventional energy sources. Renewable energy across the Global and in India. Renewable energy for rural applications, Renewable energy for urban, industrial and commercial applications

Solar Energy: Solar cell fundamentals: Semiconductors, Photovoltaic effect, Solar PV cell, module, panel, array, Solar cell operating characteristics: Voltage-current characteristic, energy losses, maximising the performance. Applications of solar energy, Solar energy program in India, Case study

UNIT-II: Wind Energy and Waste to Energy:

Wind Energy: Nature of wind, Basic components of Wind Energy Conversion System(WECS), Power extraction from the wind, Applications of wind energy. Wind energy program in India, Case Study

Waste to Energy: Key issues, Waste recovery management, Case study

UNIT-III: Biomass Energy and Fuel Cells:

BiomassEnergy: Definition, Bio fuels, Biomass resources, Biomass conversion technologies: Incineration- Thermo chemical conversion- Bio-chemical conversion. Advantages and disadvantages of biomass energy, Case study

Fuel Cells: Definition-Classification of fuel cells, Principle of operation, Hydrogen-oxygen fuel cell, Alkaline fuel cell, Proton exchange membrane fuel cell, Molten carbonate fuel cell, Solid oxide electrolyte cells, Comparison of fuel cells- Advantages and Disadvantages of fuel cells-Applications of Fuel cells. Case study

UNIT-IV: Ocean Energy and Geothermal Energy:

Ocean Energy: Ocean thermal electric conversion (OTEC) methods: Open cycle and Closed cycle- Principles of tidal power generation-Advantages and limitations of tidal power generation, Case study

Geothermal Energy: Geothermal resources- Vapour dominated geothermal plant- Liquid dominated geothermal plant- Applications of Geothermal Energy, Case study

Learning Resources:

1. B H KHAN, Non-Conventional Energy Resources, McGraw Hill, 2nd Edition, 2009.
2. G. S. Sawhney, Non-Conventional Energy Resources, PHI Learning Pvt Ltd, 2012
3. ShobhNath Singh, Non-Conventional Energy Resources, Pearson, 2016
4. G.D. Rai, Non-Conventional Energy Sources ,Khanna Publishers, New Delhi, 2011.
5. Ashok Desai V, Non-Conventional Energy, Wiley Eastern Ltd, 1990.

6. Mittal K.M, Non-Conventional Energy Systems, Wheeler Publishing Co. Ltd, 1997.
7. Ramesh R, Kurnar K.U, Renewable Energy Technologies, Narosa Publishing House, New Delhi

The break-up of CIE : Internal Tests+Assignments+Quizzes

1. No. of Internal Tests : Max. Marks for each Internal Test :
2. No. of Assignments : Max. Marks for each Assignment :
3. No. of Quizzes : Max. Marks for each Quiz Test :

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Mechanical Engineering

INTRODUCTION TO INDUSTRIAL ROBOTICS

(Stream: Robotics)

(Open Elective-I)

SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U25OE310ME
Credits :02	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE The objective of the course is to	COURSE OUTCOMES On completion of the course, students will be able to
study industrial robot components, configuration, sensors, drives, applications and programming through experiential learning.	1 explain configuration of industrial robots and summarize various applications. 2 interpret various elements of the industrial robots 3 Develop methodology to represent position and orientation of industrial robot links in spatial coordinate system. 4 classify various sensors used in industrial robots and interface between the human user and an industrial robot using various programming languages.

CO-PO and CO-PSO mapping															
CO	PO mapping												PSO mapping		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2			1	2	2					2	3	1	2
CO2	3	2			1	2	2					2	3	1	2
CO3	3	2			1	2	2					2	3	1	2
CO4	3	2			1	2	2					2	3	1	2

UNIT-I

ROBOT BASICS

Robot-Basic concepts, Need, Law, History, Anatomy, specifications.

Robot configurations-cartesian, cylindrical, polar, articulated and SCARA. Parallel robots

ROBOT APPLICATIONS

Application in industry – material handling, loading & unloading, processing, welding & painting, assembly and inspection

UNIT-II

ROBOT ELEMENTS

End effectors-Classification, Types of Mechanical actuation, Gripper design, Robot joints types, Robot drive system types: Electrical, pneumatic and hydraulic.

UNIT-III

ROBOT COORDINATE SYSTEMS

Coordinate frames, Rotation matrix, Euler angles, Roll pitch and yaw angle representation, Composite rotations, Homogeneous Transformation matrix.

UNIT-IV

ROBOT SENSORS

Sensors in robots – Touch sensors-Tactile sensors – Proximity and range sensors. Force sensors

Robot programming

On line programming, teach pendant control, Lead through, Walk through, off line programming, Task programming.

Learning Resources:

1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel and Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", Tata Mc Graw-Hill Publishing Company Limited, 2008.
2. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata Mc Graw Hill Publishing Company Limited, 2010.
3. Klafter R.D, Chmielewski T.A, and Negin. M, "Robotic Engineering: An Integrated Approach", Prentice Hall of India Pvt. Ltd., 1994.
4. K.S. Fu, R.C. Gonzalez and C.S.G. Lee, "Robotics control, sensing, vision and intelligence", Tata Mc Graw-Hill Publishing Company Limited, 2008
5. R.K. Mittal and I. J. Nagrath "Robotics and Control", Tata Mc Graw-Hill Publishing Company Limited, 2003.

The break-up of CIE: Internal Tests+Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05
Duration of Internal Test:				90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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Department of Mechanical Engineering

FUNDAMENTALS OF UNMANNED AERIAL VEHICLES

(General Pool)

(Open Elective-I)

SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U25OE320ME
Credits :02	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVE	COURSE OUTCOMES
	<i>On completion of the course, students will be able to</i>
The objective of this Course is to understand the features, basics of flight, manufacturing and analysis of UAV and Artificial Intelligence in UAV systems.	1. classify various types of UAVs, describe their characteristics, and analyze their applications. 2. illustrate, explain and interpret the fundamental concepts of aerodynamics relevant to flight vehicles. 3. fabricate, and analyse UAV components using appropriate tools and techniques. 4. identify, explain, and evaluate the role of Artificial Intelligence in UAV systems for autonomous operations.

CO-PO and CO-PSO mapping															
CO	PO mapping												PSO mapping		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2				3	3	3				3	3	2	3
CO2	3	3				3	3	2				3	3	2	3
CO3	3	2				3	3	2				3	3	2	3
CO4	3	2				3	3	2				3	3	2	3

Unit-I:

Introduction to UAV

UAV: Definition, History; Difference between aircraft and UAV; DGCA Classification of UAVs; Types and Characteristics of Drones: Fixed, Multi-rotor, and Flapping Wing; Applications: Defense, Civil, Environmental monitoring.

Unit-II:

Basics of Flight

Different types of flight vehicles; Components and functions of an airplane; Forces acting on Airplane; Physical properties and structure of the atmosphere; Aerodynamics – aerofoil nomenclature, aerofoil characteristics, Angle of attack, Mach number, Lift and Drag, Propulsion and airplane structures.

Unit-III:

Manufacturing and Analysis of UAV

Drone Manufacturing, Additive Manufacturing, Health Evaluation and Failsafe, Introduction to CAD; Design of UAV components; Structural Analysis using CAE; Aerodynamic Analysis using CFD; Manufacturing of the components of UAVs: 3D printing; Case studies;

Unit-IV:

Artificial Intelligence in UAV Systems

Components: Arms, motors, propellers, electronic speed controller (ESC), flight controller; Propulsion; Data Link; Sensors and Payloads: GPS, IMU, Light Detection and Ranging (LiDAR), Imaging cameras, Classification of payload based on applications; Hyper-spectral sensors; Laser Detection and Range (LADAR); Synthetic Aperture Radar (SAR); Thermal cameras; ultra-sonic detectors; Case study on payloads. Introduction to navigation systems and types of guidance; Mission Planning and Control.

Learning Resources:

1. Andey Lennon, "Basics of R/C Model Aircraft Design" Model Airplane News Publication
2. John Baichtal, Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs.
3. K Valavanis, George J Vachtsevanos, Handbook of Unmanned Aerial Vehicles, New York, Springer, Boston, Massachusetts : Credo Reference, 2014. 2016.
4. DGCA RPAS Guidance Manual, Revision 3 – 2020

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05
	Duration of Internal Test:	90 Minutes		

VASAVI COLLEGE OF ENGINEERING(Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Chemistry

CORROSION SCIENCE AND TECHNOLOGY

(Open Elective-I)

SYLLABUS FOR B.E.III-SEMESTER

Instruction :2Hrs / Week	SEE Marks : 60	Course Code : U26OE310CH
Credits: 2	CIE Marks : 40	Duration of SEE : 3Hours

OBJECTIVES	OUTCOMES
The course will enable the students:	At the end of the course students should be able to:
1. To acquaint with the causes of corrosion and different types of corrosion. 2. To understand the factors influencing corrosion and Controlling Corrosion by Inhibitors and Organic Coatings. 3. To know different corrosion control coatings like electroplating and electroless plating. 4. To familiarize with various preventive methods of corrosion such as cathodic protection and surface conversion.	1. Explain different types of corrosion with suitable examples. 2. Discuss different factors that affect corrosion and protection by organic coatings and inhibitors. 3. Select a suitable metallic coating for corrosion control 4. Discuss the principles and application of cathodic protection and surface conversion coatings for corrosion control.

CO-PO MAPPING												
CO	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1	-	-	-	-	1	-	-	-	-	1
CO2	2	1	-	-	-	-	1	-	-	-	-	1
CO3	2	1	-	-	-	-	1	-	-	-	-	1
CO4	2	1	-	-	-	-	1	-	-	-	-	2

UNIT-I: CHEMICAL AND ELECTROCHEMICAL CORROSION

Introduction - gravity, cause, Chemical and Electrochemical corrosion - Mechanism, Pilling – Bed worth rule, effect of nature of oxide layer on rate of chemical corrosion, electrochemical series and galvanic series. Formation of anodic and cathodic areas, Galvanic corrosion, Differential aeration corrosion -pitting, water line corrosion & crevice corrosion, stress corrosion, corrosion fatigue.

UNIT-II: CORROSION CONTROL METHODS

INHIBITORS AND ORGANIC COATINGS

A. Factors influencing corrosion

Nature of metal: Relative position of metal in galvanic series, over voltage, relative areas of anode & cathode and nature of corrosion product.

Nature of environment: temperature, pH and humidity.

B. Corrosion Control by Inhibitors and Organic Coatings

Corrosion Inhibitors: Anodic, Cathodic and vapor phase inhibitors.

Organic Coatings: Paints – constituents and their functions, vitreous enamel coatings, varnishes and lacquers.

UNIT-III: METALLIC COATINGS

Passivation of metals, polarization curve of passivating metals, effect of pH and potential-pH diagram for iron (Pourbaix Diagram) and polarization curve of iron, application of Pourbaix diagram for corrosion mitigation.

Metallic coatings: Types - anodic & cathodic. Surface pre-treatment of base metal.

Methods of application of metallic coatings: Hot dipping- galvanization - applications of galvanized RCC steel bars. Cladding, electro plating & electroless plating- principle and their differences.

Electroplating of Cu coating on Fe, Electroless plating of Ni coating on Insulators, Preparation of PCB using Electroless plating.

UNIT-IV: CATHODIC PROTECTION AND SURFACE CONVERSION

Cathodic protection: Principle, sacrificial anodic protection (SAP), impressed current cathodic protection (ICCP). Application of cathodic protection for bridges, ship hulls and underground pipelines.

Surface conversion coatings: Carburizing, Nitriding, Cyaniding.

Text Books:

1. P.C.Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub, Co., New Delhi (2002)
2. S.S. Dara "A text book of engineering chemistry" S.Chand&Co.Ltd., New Delhi (2006).
3. O.G. PALANNA, Engineering Chemistry, TMH Edition.
4. Chemistry of Engineering Materials by R.P Mani and K.N.Mishra, CENGAGE learning
5. Shasi Chawla, "Text Book of Engineering Chemistry", Dhanpat Rai Publishing Company, NewDelhi (2008).

Suggested Reading:

1. Principles and prevention of corrosion: Denny A Jones, Prentice Hall, 1996.
2. Derek Pletcher and Frank C. Walsh, "Industrial Electrochemistry", Chapman and Hall, New York, 1993
3. Fundamentals of Corrosion: Michael Henthorne, Chemical Engineering
4. Corrosion Engineering: Mars G Fontana, Mc Graw Hill, 1987

The break-up of marks for CIE :

Internal Tests + Quiz Tests + Assignments

- | | | | |
|---------------------------|---|-------------------------------------|----|
| 1. No. of Internal Tests: | 2 | Max. Marks for each Internal Tests: | 30 |
| 2. No. of Assignments: | 2 | Max. Marks for each Assignments: | 5 |
| 3. No. of Quizzes: | 2 | Max. Marks for each Quiz Tests: | 5 |

Duration of Internal Tests : 90 minutes

VASAVI COLLEGE OF ENGINEERING(Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Humanities and Social Sciences**HUMAN RESOURCES MANAGEMENT FOR ENGINEERS
(Stream: Management courses for Engineers)
(Open Elective-I)**

SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U25OE310EH
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES The course will enable the learners to:	COURSE OUTCOMES At the end of the course the learners will be able to: -
1. Understand the scope, evolution, and strategic importance of Human Resource Management. 2. Develop knowledge of human resource planning, job analysis techniques, recruitment and selection. 3. Explore training, development, and career growth practices in organizations. 4. Gain insights into performance management, compensation practices, and contemporary HR issues.	1. Explain the scope, evolution, and strategic importance of HRM in organizational effectiveness. 2. Apply HR planning, job analysis, recruitment, and selection methods in organizational contexts. 3. Design and evaluate training, development, and career planning initiatives to enhance employee growth. 4. Implement and assess performance appraisal and compensation practices while addressing contemporary HR issues.

CO-PO mapping												
CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1											3	3
CO2											3	3
CO3											3	3
CO4											3	3
CO5											3	3

Unit-I : Introduction to Human Resource Management

Introduction - Nature and Objectives of HRM - Scope of HRM - Evolution of HRM - Importance of HRM - Environment of HRM - External and Internal Forces Acting on HRM - Strategic HRM.

Unit-II : Human Resources Planning

Human Resource Planning - Nature and Importance of Human Resource Planning - Factors Affecting HR Planning - Requisites for Successful HR Planning - Nature of Job Analysis - Process of Job Analysis- Methods of Collecting Data for Job Analysis - Recruitment - Sources of Recruitment - Selection Process - Induction and Onboarding.

Unit-III : Training and Development

Nature and Importance of Training and Development- Inputs in Training and Development - Training Needs Assessment - Training Process - Impediments to Effective Training - Career Development.

Unit-IV : Performance Management and Contemporary Issues in HRM

Performance Management - Performance Appraisal Process - Methods and Challenges of Performance Appraisal - Compensation and Reward Management - Performance-Based Incentives - Ethical Issues in HRM - Employee Privacy Issues and Surveillance - Workplace Harassment - Employer Branding - Green HRM - Managing Global Workforce.

Learning resources:-

1. Human Resource Management – Gary Dessler.
2. Human Resources Management, V Edition, K Ashwatappa, McGraw Hill Publication
3. P. Subba Rao, Human Resource Management, Himalaya Publishing House.

The break-up of marks for CIE :

Internal Tests + Quiz Tests + Assignments

- | | | | |
|----------------------------|--------------|-------------------------------------|----|
| 1. No. of Internal Tests: | 2 | Max. Marks for each Internal Tests: | 30 |
| 2. No. of Assignments: | 2 | Max. Marks for each Assignments: | 5 |
| 3. No. of Quizzes: | 2 | Max. Marks for each Quiz Tests: | 5 |
| Duration of Internal Tests | : 90 minutes | | |

VASAVI COLLEGE OF ENGINEERING(Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Humanities and Social Sciences

FINANCIAL SERVICES

(Stream: BFSI)

(Open Elective-I)

SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U250E350EH
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

Course Objectives: The course will enable learners: 1. 1. To gain understanding of working of banking companies 2. 2. To comprehend the Risk aspects Insurance Companies 3. 3. To understand the concepts and applications of Financial instruments 4. 4. To gain understanding of Financial Markets infrastructure	Course Outcomes: On completion of the course, students will be able to: 1. Examine and classify banking operations 2. Analyze the Risks involved in Insurance Business 3. Evaluate and invest in different financial assets available in the market 4. Analyze the working of financial markets
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CO-PO mapping												
CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1					1			2			3	3
CO2					1			2			3	3
CO3					1			2			3	3
CO4					1			2			3	3

Unit I BANKING (8 hours)

Nature and Functions of commercial banks –Banking Assets and Liabilities - distribution channels in Wholesale and Retail banking –KYC and its importance in Banking – Role of Banks in Anti Money Laundering – Automated processing of payments – NEFT, RTGS, IMPS, SWIFT- Risks in Banking – Credit Risk, Interest Rate Risk, Liquidity risk and Frauds.

Unit II INSURANCE (6 hours)

Concept- Principles – Functions of Insurance - Life Insurance – Products - Health and General Insurance - Products and Services - Eco system of Insurance– Insurance companies- Advisors- underwriters – TPAs - Actuaries - Reinsurance – Overview of IRDA

Unit III - Financial Markets (9 hours)

Capital Markets – Primary and Secondary Market –Money Market – Instruments in Capital and Money Market - Nature and concept of Equities – Common Shares – Preference equity - – Nature and Functions- Bonds – characteristics – Valuation – Hybrid Financial instruments

UNIT IV - DERIVATIVES AND MARKET INFRASTRUCTURE (7 hours)

Derivatives – Meaning - Uses – Types of Derivatives – Forwards – Futures- Options – Recent Trends in Derivative Trading. Financial Market Infrastructure Institutions – Nature and Functions of Stock Exchanges - Depositories - Clearing Houses – Role and Functions of Regulators in Financial Markets – RBI – SEBI – IRDAI.

References

M Y Khan, Financial Services, 10th Edition, Tata McGraw Hill
www.sebi.gov.in
www.rbi.org.in

The break-up of marks for CIE :

Internal Tests + Quiz Tests + Assignments

- | | | | |
|---------------------------|---|-------------------------------------|----|
| 1. No. of Internal Tests: | 2 | Max. Marks for each Internal Tests: | 30 |
| 2. No. of Assignments: | 2 | Max. Marks for each Assignments: | 5 |
| 3. No. of Quizzes: | 2 | Max. Marks for each Quiz Tests: | 5 |

Duration of Internal Tests : 90 minutes

VASAVI COLLEGE OF ENGINEERING(Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Humanities and Social Sciences

POLITICAL SCIENCE (Common to all branches) (Open Elective-I)

SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U25OE370EH
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

Course Objectives By the end of the course, learners will be able to:	Course Outcomes On completion of the course, learners will be able to:
1. To introduce students to the foundations of Political Science. 2. To understand Indian political ideas, institutions, and ideologies. 3. To familiarize students with political thinkers and constitutional values. 4. To develop analytical understanding of Indian politics and governance.	1. Explain core political concepts such as state, sovereignty, rights, justice, liberty, and duties. 2. Describe contributions of key Western and Eastern political thinkers. 3. Compare political ideas across civilizations. 4. Understand major currents in modern Indian political philosophy. 5. Demonstrate basic analytical skills in interpreting political ideas.

CO-PO mapping												
CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1					3							
CO2					3							
CO3												3
CO4					3							

UNIT–1: Introduction to Political Science- 8 Hours

Meaning, scope, and relevance of Political Science

- **Key concepts:** state, sovereignty, power, authority, legitimacy
- **Forms of government:** monarchy, aristocracy, democracy

UNIT 2: Political Thought -12 Hours

- A. Classical and Medieval political Theory:** Plato & Aristotle; St. Augustine & Thomas Aquinas; Machiavelli
- B. Modern Political Theory:** Hobbes; Locke; Rousseau; JS Mill & Karl Marx

UNIT 3: Political Ideologies -11 Hours

Introduction: Role of ideas, Features of ideology, Left/Right divide

- A. Classical Ideologies:** Liberalism/Capitalism, Socialism/Communism, Nationalism, Gandhism, Fascism
- B. New ideologies:** Feminism, Ecologism, Religious Fundamentalism

UNIT 4: Indian Political Thought -11 Hours

- A. Classical Indian Political Thought:** Dharmashastra, Arthashastra, and Buddhist traditions
- B. Modern Indian Political Thought:** Sir Syed Ahmed Khan, Swami Vivekananda, Bal Gangadhar Tilak, Sri Aurobindo, Dr. B.R. Ambedkar and M.S. Gowalkar
- C. Comparative perspective:** Western and Eastern

Learning Resources

Suggested Reference Books

- Andrew Heywood, Political Theory: An Introduction
- O.P. Gauba, Introduction to Political Theory
- Brian R. Nelson, Western Political Thoughts
- Andrew Heywood, Political Ideologies, An introduction
- V.R. Mehta, Foundations of Indian Political Thought

The break-up of marks for CIE :

Internal Tests + Quiz Tests + Assignments

- | | | | |
|---------------------------|---|-------------------------------------|----|
| 1. No. of Internal Tests: | 2 | Max. Marks for each Internal Tests: | 30 |
| 2. No. of Assignments: | 2 | Max. Marks for each Assignments: | 5 |
| 3. No. of Quizzes: | 2 | Max. Marks for each Quiz Tests: | 5 |

Duration of Internal Tests : 90 minutes

VASAVI COLLEGE OF ENGINEERING(Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Humanities and Social Sciences**CONSTITUTION OF INDIA –
BASIC FEATURES & FUNDAMENTAL PRINCIPLES
(Open Elective-I) (Common to all branches)
SYLLABUS FOR B.E.III-SEMESTER**

L:T:P(Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U25OE360EH
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES The course will enable the learners to: 1. To acquaint the students with legacies of constitutional development in India and help them to understand the most diversified legal document of India and philosophy behind it. 2. To make students aware of the theoretical and functional aspects of the Indian Parliamentary System. 3. To channelize students' thinking towards basic understanding of the constitutional principles and statutory institutions.	COURSE OUTCOMES At the end of the course the learners will be able to: - 1. Identify and explore the basic features and modalities about Indian constitution. 2. Understand the administrative structure of various branches of government. 3. Differentiate and relate the functioning of Indian parliamentary system at the center and state level. 4. Examine different aspects of Indian Legal System and its related bodies.
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CO/PO	CO-PO mapping											
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1						3		1				3
CO2						3		1				3
CO3						3		1				3
CO4						3		1				3

CONSTITUTION OF INDIA – BASIC FEATURES & FUNDAMENTAL PRINCIPLES

Unit - I

Constitution: Meaning & Constitutionalism, Historical perspective: 1909 Act, 1919 Act & 1935 Act, Salient features & nature of the Constitution,

Unit-II

Fundamental Rights: Introduction & its scheme, Right to Equality (Art.14), Right to Fundamental Freedoms (Art. 19), Right to Life (Art. 21), Directive Principles of State Policy: importance and implementation, Fundamental Duties and its legal status.

Unit –III

Government: Union & State – Executive & Legislature, composition, powers and functions, Local Self Governments – Panchayat Raj Institutions & Urban Local Bodies (Municipalities). Statutory Institutions: Elections-Election Commission of India, National Human Rights Commission, National Commission for Women.

Unit - IV

Federal structure & distribution of legislative and financial powers between the Union and the States.

Suggested Readings:

1. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, New Delhi.
2. Indian Constitution by Subhash C. Kashyap, National Book Trust, New Delhi.
3. Constitution of India and Professional Ethics, Dr. G. B. Reddy & Mohd. Suhaib, Dreamtech Press.
4. B.Z. Fadia & Kuldeep Fadia, Indian Government & Politics, Lexis Nexis, New Delhi.
5. Indian Polity by Laxmikanth 5th Edition, McGraw Hill.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Fundamentals of Entrepreneurship
(Stream: Entrepreneurship) (Open Elective-I)
SYLLABUS FOR B.E. III - SEMESTER

L:T:P (Hrs./week) : 2:0:0	SEE Marks : 60	Course Code: U25OE310EH
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVE The objective of the course is to	COURSE OUTCOMES On completion of the course, students will be able to
1. Cultivate an entrepreneurial mindset. 2. Identify and assess business opportunities. 3. Understand core business fundamentals. 4. Leverage AI for smart business planning.	1. Exhibit an entrepreneurial and innovative mindset. 2. Identify and evaluate market-driven opportunities. 3. Apply core business concepts in real-world scenarios. 4. Use AI tools for data-driven business planning.

CO-PO and CO-PSO mapping														
CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1									2			1		
CO2		1					2		2				1	
CO3							2				2		1	
CO4				1							1			1
AVG.		1		1			2		2		1.5	1	1	1

UNIT-I Introduction and Opportunity Recognition:

Definition and importance of entrepreneurship, Characteristics of successful entrepreneurs, Types of entrepreneurship (e.g., social, technological, corporate), Techniques for identifying business opportunities, Market research methods and trend analysis. AI Integration: Google Trends, ChatGPT, Exploding Topics

UNIT-II Business Models and Planning:

Understanding different business models, Introduction to business planning, Feasibility analysis, Basics of business laws and regulations, Ethical issues in entrepreneurship. AI Tools: LivePlan, Notion AI

UNIT-III Financing and Team Management:

Sources of funding: bootstrapping, angel investors, venture capital, Basics of financial planning and budgeting, Understanding financial statements, Team dynamics and leadership, Conflict resolution techniques

UNIT-IV Design Thinking and Product Development: Design thinking methodology, Innovation and problem-solving techniques, Creating prototypes and MVPs, Tools and technologies for prototyping. Customer validation techniques. Tools: Canva, Miro; AI Tools: Uizard, Framer AI

Learning Resources:

1. Entrepreneurship - Rajeev Roy, Oxford University Press
2. Entrepreneurship Development - S.S. Khanka, S. Chand Publishing
3. Business Model Generation - Alexander Osterwalder & Yves Pigneur, Wiley
4. The Lean Startup - Eric Ries, Crown Business (Penguin Random House)
5. Change by Design - Tim Brown, Harvard Business Review Press
6. Financial Management - I.M. Pandey, Vikas Publishing House

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2. No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3. No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING(Autonomous)

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DEPARTMENT OF PHYSICS

FUNDAMENTALS OF SMART MATERIALS AND APPLICATIONS (Open Elective-I)

SYLLABUS FOR B.E.III-SEMESTER

Instruction :2Hrs/Week	SEE Marks : 60	Course Code : U25OE310PH
Credits: 2	CIE Marks : 40	Duration of Semester End Exam:3 hrs

Course Objectives	Course Outcomes
The student will be able to 1. To introduce various types of smart materials used in engineering. 2. Grasp the concepts of piezo and ferroelectric materials. 3. Learn fundamentals of pyro and thermoelectric materials 4. Gain knowledge on shape memory alloys	the student should at least be able: 1. Identify various smart materials and their significant applications. 2. Summarize various properties and applications of piezo and ferroelectric materials. 3. Apply fundamental principles of pyro and thermoelectricity in relevant fields of engineering. 4. Explain types of shape memory alloys and their properties and applications

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C01	2	-	-	-	-	-	-	-	-	-	-	1			
C02	3	-	-	-	-	-	-	-	-	-	-	1			
C03	3	3	-	-	-	-	-	-	-	-	-	1			
C04	3	-	-	-	-	-	-	-	-	-	-	1			
C05	2	-	-	-	-	-	-	-	-	-	-	1			

UNIT I: INTRODUCTION TO SMART MATERIALS (6 hours)

Characteristics of metals, polymers and ceramics. Introduction to smart materials, need for smart materials, Classification of smart materials, Components of a smart System, Applications of smart material, role of smart materials in developing intelligent systems and adaptive structures.

UNIT II: PIEZO AND FERRO ELECTRIC MATERIALS (8 hours)

Piezo electric effect and inverse piezoelectric effect, Piezo electric materials, Structure of Quartz crystal, piezoelectric oscillator, Magnetostriction, Magnetostriction oscillator, piezo-electric sensors, applications of Piezo-electric materials. Characteristics and properties of ferroelectric materials, Curie-Weiss law, applications of Ferro electric materials.

UNIT III: PYRO AND THERMO-ELECTRIC MATERIALS (6 hours)

Pyro electricity: pyro electric effect, pyro electric materials, pyro-electric detector.

Thermoelectricity: thermoelectric effect, Seebeck effect, Peltier effect, thermocouple, Principle and working of thermoelectric generator and Thermoelectric cooler, applications of thermoelectric materials

UNIT IV: SHAPE MEMORY MATERIALS (8 hours)

Introduction to shape memory alloys (SMA)- Shape Memory Effect (SME), Austenite, Martensite phases, Properties and characteristics SMAs, one-way and two-way shape memory effects, Properties of Ni-Ti shape memory alloy, Cu-based shape memory alloys, and their applications, Applications of SMAs.

Learning Resources:

1. Mukesh V. Gandhi, Brian S Smart Materials and Structures, Thompson, Springer, May- 1992
2. D. Patranabis, Sensors and Transducers, PHI Learning Pvt. Ltd., 2022
3. Nachiketa Tiwari, Bishakh Bhattacharya, Smart Material, Adaptive Structures & Intelligent Mechanical Systems

The break-up of marks for CIE :

Internal Tests + Quiz Tests + Assignments

- | | | | |
|----------------------------|--------------|-------------------------------------|----|
| 1. No. of Internal Tests: | 2 | Max. Marks for each Internal Tests: | 30 |
| 2. No. of Assignments: | 2 | Max. Marks for each Assignments: | 5 |
| 3. No. of Quizzes: | 2 | Max. Marks for each Quiz Tests: | 5 |
| Duration of Internal Tests | : 90 minutes | | |

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MATHEMATICS

NUMBER THEORY & BOOLEAN ALGEBRA (Open Elective-I)

SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U250E310MA
Credits :02	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to :	At the end of the course students should be able to:
1. Study Fundamental Theorem of Arithmetic and GCD using Euclidean Algorithm and also Linear Diophantine Equations and their solutions.	1. Calculate GCD using Euclidean algorithm and also solve Linear Diophantine Equations in order to implement in RSA encryption.
2. Understand the concepts of number theory such Congruences and proof of Chinese Remainder theorem.	2. Apply Chinese Remainder theorem for optimizing cryptographic processes, such as accelerating RSA decryption and the Pollard Rho method to assess and demonstrate the factorization of composite numbers used in cryptographic keys.
3. Identify Primitive roots for primes and their existence and also to outline the Euler's theorem and Lagrange's theorem.	3. Use Fermat's Theorem & Wilson's theorem to prove that RSA works accurately and also in discrete log cipher of Cryptography. Also primitive roots in the Diffie-Hellman key exchange protocol of Cryptography
4. Familiarize with properties of Boolean algebra and to understand Normal Forms.	4. Design secure hash functions, encryption schemes, and authentication protocols using Boolean functions which are the building blocks of symmetric cryptographic systems.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2										1	3	2	
CO2	3	2										1	3	2	
CO3	3	2										1	3	2	
CO4	3	2										1	3	2	
CO5	3	2										1	3	2	

UNIT – I (6 Hours)

THEORY OF NUMBERS: The Integers and Division- Prime and Composite Numbers -Division Algorithm- Fundamental Theorem of Arithmetic(without proof) –GCD and their properties- Euclidean Algorithm- Linear Diophantine Equations and their solutions.

UNIT – II (8 Hours)

CONGRUENCES: Modular Arithmetic- Introduction to Congruences, Linear Congruence. Chinese Remainder Theorem - System of Linear Congruences in two variables- The Pollard Rho Factoring Method.

UNIT – III (5 Hours)

SOME SPECIAL CONGRUENCES: Fermat's Little Theorem- Wilsons Theorem and its converse Euler's phi-function - Euler's theorem -The order of an integer modulo n , Primitive roots for primes.

UNIT – IV (6 Hours)

BOOLEAN ALGEBRA: Axiomatic definition of Boolean Algebra, Basic theorems and Properties of Boolean Algebra, Boolean Functions, Minterms and Maxterms, Disjunctive normal form and conjunctive normal form.

Text Books:

1. K.H. Rosen: Elementary Number Theory & its Applications, Pearson Addition Wesley
2. Elementary Number Theory | 7th Edition by David Burton, Mc Graw Hill Education
3. Discrete mathematics for computer scientists and mathematicians / by Joe L. Mott, Abraham Kandel and Theodore P. Baker, Prentice Hall Of India Pvt.Ltd., 1986.Edition: 2nd edition, New Delhi.
4. Discrete Mathematics, R.K.Bisht and H.S.Dhami, Oxford Higher Education.

Reference Books:

1. N. Koblitz; A course in Number theory and Cryptography; Springer.
2. Neville Robinns, Beginning Number Theory (2nd Edition), Narosa Publishing House Pvt. Limited, Delhi, 2007.
3. Elementary Number Theory with Applications, Thomas Koshy, 2nd edition, Academic Press, An Imprint of Elsevier, USA, 2007.
4. Basic Number Theory by S.B. Malik, S. Chand publishers
5. Arnold B. H.: Logic and Boolean Algebra, Prentice Hall, 1962.

Online Resources:

1. <https://www.classcentral.com/course/openlearn-science-maths-technology-introduction-number-theory-95553>
2. <https://www.open.edu/openlearn/science-maths-technology/introduction-number-theory/content-section-0?intro=1>
3. <https://ocw.mit.edu/courses/6-042j-mathematics-for-computer-science-fall-2010/resources/lecture-4-number-theory-i/>

The break-up of CIE : Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5
	Duration of Internal Tests	:	90 Minutes			

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

CRITICAL THINKING

SYLLABUS FOR B.E. - III Semester

Instruction : 2.0.0	SEE : 40	Course code : U25HS310EH
Credits : 1	CIE : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. Understand the basics of logic, reasoning, and identifying biases. 2. Learn to evaluate evidence and differentiate between facts and opinions. 3. Introduce frameworks like SWOT and root cause analysis for problem-solving. 4. Develop critical thinking skills through case studies and ethical debates.	At the end of the course the learners will be able to: - 1. Students will identify assumptions, biases, and logical fallacies in real-world scenarios. 2. Learn to evaluate evidence and differentiate between facts and opinions. 3. Students will apply structured methods to analyze problems and propose actionable solutions. 4. Students will demonstrate critical thinking through group discussions and case study analyses

CO-PO mapping												
CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1		3										
CO2				3								
CO3			3									
CO4												3

OVERVIEW:

In a world where automation and AI are rapidly transforming the workforce, critical thinking has become a vital human skill that sets professionals apart. This course empowers engineering students to think independently, evaluate information logically, and make well-reasoned decisions. Through engaging with real-world problems, ethical dilemmas, and structured problem-solving tools, students will develop the ability to question intelligently, respond thoughtfully, and contribute meaningfully in AI-assisted environments.

UNIT 1: Fundamentals of Critical Thinking

Introduces the foundations of logical thinking and the importance of recognizing faulty reasoning.

- 1.1 Logic and Reasoning
- 1.2 Identifying Assumptions
- 1.3 Bias and Fallacies

Learning Outcomes:

- Understand and apply the basics of logical thinking and structured reasoning
- Identify personal and systemic assumptions in real-world and technical contexts
- Detect common biases and fallacies in digital content and AI-generated outputs

UNIT 2: Analytical Thinking

Equips students to analyze information critically and draw conclusions based on solid evidence.

- 2.1 Evaluating Evidence
- 2.2 Drawing Logical Conclusions
- 2.3 Differentiating Facts from Opinions

Learning Outcomes:

- Evaluate the reliability and relevance of data from human and AI sources
- Draw logical conclusions from complex and sometimes incomplete datasets
- Differentiate between subjective opinions and objective, verifiable information

UNIT 3: Problem-Solving Frameworks

Builds practical decision-making skills using structured, human-driven analytical tools.

- 3.1 Root Cause Analysis (5 Whys)
- 3.2 Decision Trees
- 3.3 SWOT Analysis

Learning Outcomes:

- Break down problems systematically to identify core issues beyond surface symptoms
- Use structured tools to support decision-making in multidisciplinary and tech-enabled environments
- Integrate strategic thinking with ethical judgment when proposing solutions

UNIT 4: Applications of Critical Thinking

Applies critical thinking to real-life contexts through discussions, debates, and case studies.

4.1 Case Studies

4.2 Group Discussions on Ethical Dilemmas

4.3 Critical Thinking in Action: Debating Complex Engineering Issues

Learning Outcomes:

- Apply critical thinking to analyze real-world problems in engineering, business, and society
- Collaborate effectively and respectfully in group settings, including diverse viewpoints
- Demonstrate ethical reasoning and informed argumentation in AI-influenced scenarios

ADDITIONAL READING:

- Martha Nussbaum Not for Profit: Why Democracy Needs the Humanities (2010).
- The Invisible Man : Ralph Ellison
- Thinking, Fast and Slow by Daniel Kahneman
- The McKinsey Mind: Understanding and Implementing the Problem-Solving Tools and Management Techniques of the World's Top Strategic Consulting Firm by Ethan M. Rasiel and Paul N. Friga

LEARNING RESOURCES

learn.talentsprint.com

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	:	1	Max. Marks for each Internal Test	:	20
2. No. of Assignments	:	1	Max. Marks for each Assignment	:	5
3. No. of Quizzes	:	1	Max. Marks for each Quiz Test	:	5

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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Department of Humanities & Social Sciences

Human Values and Professional Ethics-II

SYLLABUS FOR B.E- III SEMESTER
(COMMON FOR ALL BRANCHES)

L:T:P(Hrs/Week):1:0:0	SEE Marks: 40	Course Code: U25HS030EH
Credits: 1	CIE Marks: 30	Duration of SEE: 02 Hours

COURSE OBJECTIVES

The course will enable the learners to:

1. Create an awareness on the interrelation between Society, Ethics and Human Values
2. Understand how ethical dilemmas apply to real life scenarios
3. Develop ethical human conduct and professional competence
4. Understand the role of good ethical practices and apply it in a project

COURSE OUTCOMES

At the end of the course the learners will be able to: -

1. Identify ethical risks in everyday life and in societies that can lead to unethical choices, such as structures that diffuse responsibility or a group that has collectively de-stigmatized unethical behaviour
2. Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, and the objective presentation of data.
3. Assess their own ethical values and the social context of problems and articulate what makes a particular course of action ethically defensible
4. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

CO-PO mapping											
CO/PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1							2				1
CO2							2				1
CO3							2				1
CO4							2				1

UNIT1 - NORMATIVE ETHICS & SOCIETAL ETHICS

This unit deals with normative ethics, the branch of moral philosophy, or ethics, concerned with criteria of what is morally right and wrong. It includes the formulation of moral rules that have direct implications for what human actions, institutions, and ways of life should be like. This unit also covers societal ethics which is the systematic reflection on the moral dimensions of social structures, systems, issues, and communities.

1.1 Ethical Decision-Making Frameworks

1.2 Emerging Ethical Challenges

1.3 Building a Just Society

UNIT 2 - PROFESSIONAL ETHICS - NEED FOR ETHICAL CODES

This unit covers the code of Professional Ethics- it is designed to ensure that students learn the necessary skills that groom them to behave like employees should, one that is socially acceptable and respectful of one another. It establishes the rules for behavior and sends a message to every employee that universal compliance is expected.

2.1 The Importance of Ethical Conduct

2.2 Personal & Professional Accountability

2.3 Maintaining Public Confidence

2.4 Understanding Ethical Codes

UNIT 3 - PRIVACY

This unit covers "Cyber ethics" - the code of responsible behavior on the Internet. Just as we are taught to act responsibly in everyday life with lessons such as "Don't take what doesn't belong to you" and "Do not harm others," we must act responsibly in the cyber world as well.

The basic rule is "Do not do something in cyberspace that you would consider wrong or illegal in everyday life."

3.1 Defining Privacy

3.2 Privacy in the Digital Age

3.3 The Ethics of Surveillance

UNIT 4- Engineering Ethics for Future Innovators

This unit equips students, the future innovators of tomorrow, with a foundation in engineering ethics. Students will explore the ethical responsibilities engineers hold regarding safety, public well-being, and sustainability. Real-world scenarios and case studies will be examined to understand how ethical considerations impact engineering decisions.

4.1 Safety and Public Welfare

4.2 Sustainability and Environmental Impact

4.3 The Ethics of New Technologies

MODE of DELIVERY

• Questionnaires • Quizzes • Case-studies • Observations and practice • Home and classroom assignments	• Discussions • Skits • Short Movies/documentaries • Team tasks and individual tasks • Research based tasks • Project
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Relevant Websites, CD's and Documentaries

- <https://plato.stanford.edu/>

Learning Resources:

- learn.talentsprint.com
1. Moral Machines: Ethical Robotics and Artificial Intelligence by Wendell Wallach
 2. Thinking Like an Engineer: Studies in the Ethics of a Profession by Paul Dufour
 3. Engineering Ethics: Contemporary and Enduring Debates by Deborah G. Johnson
 4. Engineering Ethics: Concepts and Cases by Charles E. Harris, Michael S. Pritchard, Michael J. Rabins, Ray James, and Elaine Englehardt

Additional Reading

1. Akash Singh Rathore - On Constitution

The break-up of marks for CIE :

Internal Tests +Quiz Tests+ Assignments

- | | | | |
|---------------------------|---|-------------------------------------|----|
| 1. No. of Internal Tests: | 1 | Max. Marks for each Internal Tests: | 20 |
| 2. No. of Assignments: | 2 | Max. Marks for each Assignments : | 5 |
| 3. No. of Quizzes: | 2 | Max. Marks for each Quiz Tests: | 5 |

Duration of Internal Tests : 90 minutes

Unit 1: Delightful Descriptions

Participants learn to introduce themselves confidently, make detailed observations, express opinions, and describe past experiences effectively in various contexts.

- 1.1 Introductions on an Online Forum
- 1.2 Making Observations and Giving Opinion
- 1.3 Recalling and Describing

Unit 2: Formal Conversation Skills

Focuses on essential professional communication skills such as seeking and providing information, giving constructive feedback, and politely requesting permissions in formal settings.

- 2.1 Ask for Information
- 2.2 Give Information
- 2.3 Give Feedback
- 2.4 Seek Permission

Unit 3: Technical Expositions and Discussions

Develops skills to present and discuss technical content logically using structures like classification, sequencing, comparison, cause-effect relationships, and problem-solution formats.

- 3.1 Classification
- 3.2 Sequence
- 3.3 Compare and Contrast
- 3.4 Cause and Effect
- 3.5 Problem and solution

Unit 4: Rational Recap

Enhances clarity in communication through accurate paraphrasing and summarizing, both in spoken and written forms, ensuring message retention and understanding.

Unit 4: Rational Recap

- 4.1 Paraphrasing - Written
- 1.2 Summarizing - Written
- 1.3 Paraphrasing – Spoken
- 1.4 Summarizing – Spoken

METHODOLOGY

- Case Studies
- Demonstration
- Presentations
- Expert lectures
- Writing and Audio-visual lessons

ASSESSMENTS

- Online assignments
- Individual and Group

Learning Resources:

They Say / I Say: The Moves That Matter in Academic Writing" – Gerald Graff & Cathy Birkenstein

HBR Guide to Persuasive Presentations" – Harvard Business Review

Technical Communication" – Mike Markel & Stuart Selber

The Only Academic Phrasebook You'll Ever Need" – Luiz Otávio Barros
learn.talentsprint.com

The break-up of marks for CIE :

Internal Tests + Quiz Tests + Assignments

- | | | | |
|---------------------------|---|-------------------------------------|----|
| 1. No. of Internal Tests: | 2 | Max. Marks for each Internal Tests: | 20 |
| 2. No. of Assignments: | 2 | Max. Marks for each Assignments: | 5 |
| 3. No. of Quizzes: | 2 | Max. Marks for each Quiz Tests: | 5 |

Duration of Internal Tests : 90 minutes

VASAVI COLLEGE OF ENGINEERING(Autonomous)

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Department of Computer Science & Engineering

Skill Development Course-IV (Technical Skills-III)

Problem Solving through Data Structures

SYLLABUS FOR B.E. III-SEMESTER

L:T:P (Hrs./week):1:0:0	SEE Marks : 40	Course Code: UII25PE310CS
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES On completion of the course, students will be able to
1. Understand the significance of Competitive Coding 2. Prepare the students for the contests relative to the concepts learnt 3. Build confidence in coding using Linear Data structures 4. Learn essential algorithms for Competitive Coding	1. Solve scenario based problems on linked lists, Recursive Algorithms, Search & Sort Algorithms, Divide & Conquer Strategies and use memory manipulation functions. 2. Learn linear data structures usage in various applications with scenario based problem solving through coding.

CO-PO mapping												
CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	2	1	-	-	-	-	-	-	-	2
CO2	3	3	2	1	-	-	-	-	-	-	-	2

Code Complexity Analysis & Linear List data

Problem solving through Coding, Compare and contrast coding and competitive coding, Various approaches for problem solving, techniques for competitive coding, Orientation on Competitive coding on coding platforms like Codechef/ Codeforces/ Leetcode/ Hackerrank etc.

Precise coding techniques implementing the evaluation of the language supported expressions, code complexity analysis, Linear / Logarithmic/ Super linear/ Polynomial/ Exponential/ Recursion Algorithm analysis, Problem Solving using Linear list data, Subscripts, 2D Array Subscript, RMO

& CMO Representation, Matrix Problems. Company Specific Examples & Competitive Programming Practice Problems.

Contextual implementation using Competitive Coding using global coding platforms: Code chef/ Leet code / Codeforces / Hackerrank etc.

Memory Manipulation Methods and Problem Solving on ring

Pointer Variable, Pointer Arithmetic, Memory Layout, Runtime memory allocation, Problem Solving on String Data, String handling methods, Examples, Practice Problems.

Problem Solving using Linked List data

Implementing a Structure member pointer reference, Coding solutions for Linked list manipulation, Solutions for order statistic problems on linked lists: Comparison/ Cycle Detection/ Merge Point Detection/ Merging the lists, Coding solution for the circular linked data and Double linked data, coding problems, Examples, Practice problems.

Problem Solving using Abstract data structures: Stacks

Problem solving using Stacks, Coding solutions for the implementation of stack using an array, Coding solutions for the implementation of stack using a linked list. Problem solving on expression conversion and evaluation, Examples, Practice problems.

Problem Solving through Queues & Search-Sort Algorithms

Problem solving using Queues, Coding solutions for the implementation of queue using an array/ linked list, Divide & Conquer Strategies: Linear Vs Binary Search Analysis, Bubble sort and Selection Sort Analysis, Examples, Practice problems.

Problem Solving through Divide & Conquer Strategies

Divide & Conquer Strategies: Quick sort Analysis, Merge Sort Analysis, Min/Power functions, Examples, Practice problems.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	1	Max. Marks for each Internal Test	:	20
1	No. of Quizzes	:	1	Max. Marks for each Quiz	:	10

Duration of Internal Tests : 1 Hour 30 Minutes

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Department of Computer Science & Engineering

DATA STRUCTURES LAB SYLLABUS FOR B.E. III-SEMESTER

L:T:P(Hrs./week): 0:0:2	SEE Marks : 50	Course Code: UII25PC311CS
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	<i>On completion of the course, students will be able to</i>
1 Design and analyze linear and nonlinear data structures	1 Implement insert, delete, search, sort and traverse operations on array and linked list
2 Acquire programming skills to implement sorting and	2 Develop applications using stack and queue
3 searching techniques	3 Apply nonlinear data structures to solve a problem
Identify and apply the suitable data structure for the given real world problem	4 Implement appropriate sorting technique for a given data set
	5 Implement hashing techniques to perform dictionary operations

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	2	1	1	1							3		
CO2	3	3	2	1	1	1							3	2	
CO3	3	3	2	1	1	1							3	2	
CO4	3	2	2	1	1	1							2	1	
CO5	2	2	1		1								2	1	

Programming Exercise:

1. Implementation of Formula based representation.
2. Implementation of String Matching algorithms.
3. Implementation of Stacks, Queues.(Using both Arrays and Linked Lists)
4. Implementation of Infix to Postfix Conversion, Postfix Expression Evaluation.
5. Implementation of Singly Linked List, Doubly Linked List and Circular Linked List.

6. Implementation of Polynomial Arithmetic using Linked List.
7. Implementation of Recursive and Iterative Traversals on Binary Tree.
8. Implementation of Operations on Binary Tree (Delete Entire Tree, Copy Entire Tree, Mirror Image, Level Order, Search for a Node etc.)
9. Implementation of Binary Search Tree.
10. Implementation of operations on AVL Trees.
11. Implementation of Selection, Insertion, Merge, Quick, Heap and Radix Sort.
12. Implementation of Binary Search and Hashing
13. Implementation of B-Trees.
14. Implementation of Traversal on Graphs
15. Develop application using appropriate data structures.

Learning Resources:

1. Horowitz E, Sahni S and Susan Anderson-Freed, Fundamentals of Data structures in C, 2nd Edition(2008), Universities Press
2. Mark A Weiss, Data Structures and Algorithm Analysis In C, Second Edition(2002), Pearson
3. Kushwaha D. S and Misra A.K, Data structures A Programming Approach with C, Second Edition(2014), PHI.,
4. Gilberg R. F and Forouzan B. A, Data structures: A Pseudocode Approach with C, Second Edition(2007), Cengage Learning
5. Tanenbaum A. M ,Langsam Y. Augenstein M. J, Data Structures using C, Second Edition (2008), Pearson.
6. Thomas H. Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein, Introduction to Algorithms, Third Edition(2009), MIT Press
7. YedidyahLangsam , Moshe J. Augenstein ,Aaron M. Tenenbaum, Data Structures Using C and C++ , Second Edition(2009), PHI
8. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/lecture-videos>
9. <http://nptel.ac.in/courses/106106127/>
10. <http://www.nptel.ac.in/courses/106102064>

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

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Department of Computer Science & Engineering

OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB SYLLABUS FOR B.E. III-SEMESTER

L:T:P(Hrs./week):0:0:2	SEE Marks: 50	Course Code: UII25PC321CS
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	<i>On completion of the course, students will be able to</i>
1 Implement object oriented concepts using Java constructs	1 Implement a use-case using object oriented programming concepts
2 Develop Java application using collection frame work and streams	2 Develop applications using multi threaded programming
.	3 Implement I/O operations using console and file streams
	4 Apply collection framework to store and manipulate data
	5 Apply functional programming constructs

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C01	3	3	2	2									3		
C02	2	3	3	3	2								3		
C03	2	3	3	3	2								3	2	
C04	2	3	3	3	2								3	3	
C05	1	3	3	3	2								3		

Programming Exercise:

1. A program to demonstrate the concept of class with constructors, methods and overloading.
2. A program to demonstrate the concept of inheritance and dynamic Polymorphism Abstract class & Interface
3. A program to create Packages.
4. A program to demonstrate Exception Handling.
5. A program to demonstrate Thread Synchronization.
6. A program to work on strings using String classes.
7. A program to demonstrate the usage of Filter and Buffered I/O streams

8. A program to demonstrate Serialization and Deserialization
9. A program using List & Set interfaces, Iterator & List Iterator
10. A program using Mapinterface, Date, Calendar &Timer.
11. A program to implement object comparison using comparator
12. A program to implement Lambda Functions
13. A program to implement Stream API
14. A program to demonstrate usage of Regular Expressions

Learning Resources:

1. Herbert Schildt, Java: The Complete Reference, 12th Edition, Tata McGraw Hill 2021.
2. Joshua Bloch, Effective Java, 3rd Edition, Pearson, 2017
3. Timothy Budd, An introduction to Object-Oriented Programming, 3rd Edition, Pearson Education, 2008
4. Eric Freeman, Bert Bates, Kathy Sierra , Head First Design Patterns: A

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

Brain-Friendly Guide, 1st Edition, O'Reilly, 2016

5. P. Radha Krishna, Object Oriented Programming through Java, Universities Press,2007.
6. Sachin Malhotra, Saurabh Choudhary, Programming in Java, 2nd Edition, Oxford Press,2014.
7. <https://docs.oracle.com/javase/tutorial/java>

**SCHEME OF INSTRUCTION AND EXAMINATION(R-25)
FOR B.E BRIDGE COURSE III SEMESTER (A.Y 2026-27)**

B.E. III Semester								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P		SEE	CIE	
THEORY								
UB25BS300MA	Foundation to Engineering Mathematics	2	-	-	3	50	-	-
UB25ES310CS	Computer Programming	2	-	-	3	50	-	-
TOTAL		4	-	-	-	100	-	-
GRAND TOTAL		4				100		

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(Common to all branches)

L:T:P (Hrs./week): 2:0:0	SEE Marks : 50	Course Code : UB25BS300MA
Credits :--	CIE Marks : --	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
<i>The course will enable the students to:</i>	<i>At the end of the course students will be able to:</i>
Study the concepts of vector differentiation, Directional derivative, Divergence and Curl of a vector point function. Understand the concepts of Descriptive Statistics. Learn the basics of Set theory, Permutations and Combinations and Probability. Understand the concept of Rank of a matrix, Echelon form, System of Linear Equations and Eigen Values and Eigen Vectors.	Solve problems on fitting of a straight line to the given data and also to find co-efficient of correlation and to determine regression lines and their application problems. Apply the concepts of Descriptive Statistics to calculate Mean, Median, Mode, Measures of Dispersion, Mean Deviation and Standard Deviation. Solve the problems on Permutations, Combinations and Probability. Compute the Rank of a matrix and Eigen values and Eigen vectors of a matrix.

[illegible]

UNIT – I: (8 Hours)

CALCULUS

Differentiation of standard functions (Formulae) - Partial Derivatives – Scalar and Vector point functions -Vector Differentiation-Level Surfaces-Gradient of a scalar point function-Normal to a level surface- Directional Derivative – Divergence and Curl of a Vector field - Solenoidal and Irrotational vector

UNIT – II: (6 Hours)

DESCRIPTIVE STATISTICS

Mean-Median-Mode-Measures of Dispersion: Range-Mean Deviation-Standard Deviation

UNIT –III: (6 Hours)

BASICS OF PROBABILITY

Basics concepts of set theory - Permutations & Combinations - Random event & Experiment-Sample space - Classical definition of Probability - Axioms of probability.

UNIT – IV: (8 Hours)

MATRICES

Rank of matrix- Echelon form - System of Linear Equations- Consistency of Homogeneous and Non-homogeneous system of equations- Eigen values and EigenVectors.

TEXT BOOKS:

- 1 Advanced Engineering Mathematics, Third Edition, R. K. Jain and S. R. K. Iyengar, Narosa Publishing House.
- 2 Higher Engineering Mathematics, Dr.B.S. S Grewal 40th Edition, Khanna Publishers.
- 3 Fundamentals of Mathematical Statistics, S. C. Gupta, V.K. Kapoor, S Chand & Sons

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Department of Computer Science & Engineering

COMPUTER PROGRAMMING

SYLLABUS FOR BRIDGE COURSE B.E. III-SEMESTER

L:T:P (Hrs./week): 2:0:0	SEE Marks : 50	Course Code : UB25ES310CS
Credits :--	CIE Marks : --	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	<i>On completion of the course, students will be able to</i>
1. Acquire problem solving skills 2. Develop flow charts 3. Understand structured programming concepts 4. Write programs in C Language	1. Design flowcharts and algorithms for solving a problem and choose appropriate data type for writing programs in C language 2. Design modular programs involving input output operations, decision making and looping constructs 3. Apply the concept of arrays for storing, sorting and searching data 4. Apply the concept of pointers for dynamic memory management and string handling 5. Design programs to store data in structures and files

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	2	1									2		
CO2	3	2	2	2	1							1	3		
CO3	2	1	1	1								2	3	1	1
CO4	3	1	1	1								1	2	1	
CO5	3	2	2	2	1							1	3	1	1

UNIT-I

Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Flowcharts.

Introduction to C Language- Background, C Programs, Identifiers, Types, Variables, Constants, Input/Output, Expressions, Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion, Statements, Bitwise Operators.

UNIT-II

Selection: Logical Data and Operators, if... else, switch Statements, Standard Functions.

Repetition: Loops, while, for, do-while Statements, Loop Examples, break, continue, goto.

Functions: Designing Structured Programs, Functions Basics, User Defined Functions.

UNIT-III

Recursion-Recursive Functions, Preprocessor Commands.

Arrays: Two-Dimensional Arrays, Linear Search and Binary Search, Selection Sort and Bubble Sort.

UNIT-IV

Pointers: Introduction, Pointers to Pointers, Arithmetic operations using pointers

Strings – Concepts, C Strings, String Input/output, Functions, Arrays of Strings, String Manipulation Functions.

UNIT-V

Structure: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Unions.

Input and Output: Files, Streams, Standard Library Input/Output Functions, Character Input/Output Functions.

Learning Resources:

1. B. A. Forouzan & Richard F. Gilberg, "A Structured Programming Approach using C", 3rd Edition, Cengage Learning, 2013.
2. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Prentice-Hall, 2006.
3. Rajaraman V, "The Fundamentals of Computer", 4th Edition, Prentice-Hall of India, 2006.
4. Steve Oualline, "Practical C Programming", 3rd Edition, O'Reilly Press.
5. Jeri R. Hanly, Elliot B. Koffman, "Problem Solving and Program Design in C", 5th Edition, Pearson Education, 2007.
6. E. Balagurusamy, "Programming in ANSI C", 4th Edition, TMG, 2008.
7. Gottfried, "Programming with C", 3rd Edition, TMH, 2010.
8. R G Dromey, "How to Solve it by Computer", 1st Edition, Pearson Education, 2006.

B.E CSE(AIML) IV Semester								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
THEORY								
UII25BS410MA	Discrete Structures	3	-	-	3	60	40	3
UII25PC420CS	Database Management Systems	3	-	-	3	60	40	3
UII25PC430CS	Operating Systems	3	-	-	3	60	40	3
UII25PC440CS	Design and Analysis of Algorithms	3	-	-	3	60	40	3
UII25PC450CS	Artificial Intelligence and Machine Learning	3	-	-	3	60	40	3
U25OE4XXXX	Open Elective-II	3	-	-	3	60	40	3
U25BS430MA	Skill Development Course -V (Aptitude)	1	-	-	2	40	30	1
UII25PE410CS	Skill Development Course -VI (Technical Skills-IV)	1	-	-	2	40	30	1
PRACTICALS								
UII25PC421CS	Database Management Systems Lab	-	-	2	3	50	30	1
UII25PC431CS	Operating Systems Lab	-	-	2	3	50	30	1
UII25PC441CS	Design and Analysis of Algorithms Lab	-	-	2	3	50	30	1
UII25PC451CS	Artificial Intelligence and Machine Learning Lab	-	-	2	3	50	30	1
Library / Sports / Mentor Interaction		-	-	-	2	-	-	-
Co-Curricular Activities –I		-	-	-	2	-	-	-
TOTAL		20	-	8		640	420	24
GRAND TOTAL		28				1060		
Student should acquire one NPTEL course certification of 8 weeks duration (2 credits) during I Sem to VI Sem								

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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Department of Computer Science & Engineering**DISCRETE STRUCTURES****SYLLABUS FOR B.E. IV-SEMESTER**

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: UII25PC410MA
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
<i>The course will enable the students to:</i>	<i>At the end of the course students will be able to:</i>
Study the foundational concepts of propositional and predicate logic Understand the concepts of relations, partial orders, equivalence relations, and various types of functions. Understand the principle of inclusion and exclusion in counting problems. Study the concept of generating functions and their basic applications. Learn techniques for solving non-homogeneous recurrence relations.	Apply logical connectives, truth tables, and rules of inference to analyze and validate logical arguments. Analyze relations and functions, including partial orders and equivalence relations, and perform function operations. Solve counting problems using the principle of inclusion and exclusion. Construct generating functions to solve combinatorial problems and recurrence relations. Solve linear recurrence relations using standard techniques and generating functions.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2										3		
CO2	2	3	2										3		
CO3	2	2	2										3		
CO4	2	3	2										2	3	
CO5	3	3	2										2		

UNIT –I (08 Hours)**Fundamentals of Logic:**

Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication: Rules of inference, The Use of Quantifiers.

UNIT –II (08 Hours)

Relations and Functions:

Cartesian product and relations, Partial Orders: Hasse Diagrams, Equivalence Relations and Partitions. Functions, One-to-one, Onto Functions, Special Functions, Function Composition and Inverse Functions. Introduction to Graph theory: Directed and undirected graphs.

UNIT-III (08 Hours)

The Principle of Inclusion and Exclusion:

The Principle of Inclusion and Exclusion, Generalizations of Principle, Derangements: Nothing is in its right place, Rook Polynomials, Arrangements with Forbidden Positions.

UNIT-IV (08 Hours)

Generating Functions:

Introductory Examples, Definition and Examples: Calculational Techniques, Partitions of Integers, Exponential Generating Function, Summation Operator.

UNITV (08 Hours)

Recurrence Relations:

First – Order Linear Recurrence Relation, Second – Order Linear Homogenous Recurrence Relation with Constant Coefficients, Non Homogenous Recurrence Relation, The method of Generating functions.

Learning Resources:

1. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics, 4th Edition(2003), Pearson Education.
2. Kenneth H Rosen, Discrete mathematics and its applications, 5th Edition(2006), Tata McGraw-Hill Edition, New Delhi.
3. J.P. Tremblay, R. Manohar, Discrete Mathematical Structure with Applications to Computer Science, 4th Edition (1987), McGraw Hill , New Delhi.
4. Joe L. Mott, A. Kandel, T.P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition (1986), Prentice Hall.
5. Thomas Koshy, Discrete Mathematics with Applications, 1st Edition (2004), Elsevier Inc.
6. <http://nptel.ac.in/courses/106106094/>
7. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-fall-2010>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
	Duration of Internal Tests	:	1 Hour 30 Minutes			

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Department of Computer Science & Engineering**DATABASE MANAGEMENT SYSTEMS**

SYLLABUS FOR B.E. IV-SEMESTER

L:T:P(Hrs./week):3:0:0	SEE Marks:60	Course Code: UII25PC420CS
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVES		COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1	Identify issues involved in the design and implementation of a database system.	1 Identify the functional components of database management system. Design conceptual data model using Entity Relationship Diagram.
2	Understand transaction processing, concurrency control and recovery techniques.	2 Transform a conceptual data model into a relational model. 3 Apply normalization techniques in database design. 4 Apply indexing and hashing techniques for effective data retrieval. 5 Analyze strategies for managing security, backup and recovery of data.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		2									1	1		2
CO2	2	1	2										1		2
CO3	3	1	2		3							2	2		3
CO4	3	1	2		3							1	2		3
CO5	3	1	1									1	2		3

UNIT-I:

Introduction: Database System Application, Purpose of Database Systems, View of Data, Database Languages, Relational Database, Database Design, Data Storage and Querying, Data Mining and Information retrieval, Database Architecture, Database Users and Administrators.

Database Design and E-R Model: Overview of the Design Process, The E-R Model, Constraints, E-R Diagrams, E-R Design Issues, Extended E-R features, Reduction to Relational Schemas.

UNIT-II:

Relational Model: Structure of Relation Database, Fundamental Relational Algebra Operations, Additional Relational Algebra Operations, Extended Relational Algebra Operations, Modification of the Database, Relational Calculus.

Structured Query Language: Introduction, Basic Structure of SQL Queries, Set Operations, Additional Basic Operations, Aggregate Functions, Null Values, Nested Sub queries, Views, Join Expression.

UNIT-III:

Advanced SQL: SQL Data Types, Integrity constraints Authorization, Functions and Procedural Constructs, Recursive Queries, Triggers, JDBC, ODBC and Embedded SQL.

Relational Database Design: Features of Good Relational Designs, Atomic Domains and first Normal form, Decomposition Using Functional Dependencies, functional Dependency Theory and Decomposition using Multivalued Dependencies

UNIT-IV:

Indexing and Hashing: Basic Concepts, Ordered Indices, B+ Tree Index Files, B-Tree Files, Multiple – Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing.

Transaction Management: Transaction concept, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation and Atomicity, Serializability, Recoverability.

UNIT-V:

Concurrency Control: Lock Based Protocols, Timestamp – Based Protocols Validation Based Protocols, Deadlock Handling.

Recovery System: Failure Classification, Storage Structure Recovery and Atomicity, Log Based Recovery

NoSQL: Introduction to NoSQL, NoSQL Vs RDBMS, Categories of NoSQL Databases, Case studies: HBase, Firebase, MongoDB, Cloud DB, GraphDB Cassandra, Vector Databases

Learning Resources:

1. Abraham Silberschatz, Henry F Korth, Sudharshan S, Database System Concepts, 6th Edition(2011), McGraw-Hill International Edition.
2. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications, 1st Edition, 2019.
3. Raghu Ramakrishna, and Johannes Gehrke, Database Management Systems, 3rd Edition(2003), McGraw Hill.

4. RamezElmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentals of Database Systems, 4th Edition(2006), Pearson Education.
5. Peter Rob, Carlos coronel, Database Systems, (2007), Thomoson.
6. <http://nptel.ac.in/courses/106106093/>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

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Department of Computer Science & Engineering

OPERATING SYSTEMS
SYLLABUS FOR B.E. IV-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks: 60	Course Code: UII25PC430CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1 To provide students with fundamental concepts of operating systems including process management 2 To enable students to analyze and apply synchronization	1 Explain the structure and services of operating systems and analyze process/thread management and CPU scheduling mechanisms. 2 Apply memory management and virtual memory concepts such as paging, segmentation, and page replacement to solve system-related problems. 3 Analyze synchronization problems and apply appropriate solutions using semaphores, monitors, and deadlock handling techniques. 4 Illustrate file system organization and implementation techniques including directory structures, allocation methods, disk scheduling, and device management. 5 Explain I/O system architecture and apply protection and security principles to ensure safe and controlled system access.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	1	2	1			1						1	2	1
CO2	2	1	1	1			1					1		2	1
CO3	3	2	2				1						1	3	
CO4	2	1	2	1			1					1	1	1	
CO5	1	1	1		1							1		1	

UNIT-I:

Introduction to operating systems: Operating system services, User and Operating- system interface, System calls, Operating system structure.

Process: Process concept, Process Scheduling, Operations on process, Threads, Multithreading Models, Multicore programming.

CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiprocessor scheduling.

UNIT-II:

Memory Management: Swapping, Contiguous memory allocation, Paging, Segmentation, Structure of the page table.

Virtual memory: Demand paging, Page replacement Algorithms, Thrashing, Allocating Kernel memory.

UNIT –III:

Process synchronization: The critical Section problem, Peterson’s solution, Synchronization Hardware, Semaphores, Classic problems of Synchronization, Monitors.

Deadlocks: System model, deadlock characterization, Methods for handling deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from deadlock.

UNIT –IV:

File System Interface: File Concept, Access Methods, Directory and Disk Structure

File System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free Space management.

Device Management: Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap Space Management, RAID structure.

UNIT-V:

I/O System: I/O hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O request to hardware operation.

Protection: Goals of protection, Principles of protection, Domain of Protection, Access matrix, Implementation of Access matrix, Access Control, Revocation of Access Rights, Capability-based Systems

Security: The Security problem, Program threats

Learning Resources:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, *Operating System Concepts*, 10th Edition (2018), Wiley India.
2. Andrew S. Tanenbaum, *Modern Operating Systems*, 2nd Edition (2001), Pearson Education, Asia.
3. Dhananjay, Dhamdhare.M, *Operating System-concept based approach*, 3rd edition (2009), Tata McGraw Hill, Asia
4. Robert Love: *Linux Kernel Development*, (2004)Pearson Education
5. Richard Stevens, Stephen Rago, *Advanced Programming in the UNIX Environment*, 3rd Edition(2013), Pearson Education
6. <http://web.stanford.edu/~ouster/cgi-bin/cs140-spring19/index.php>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering**DESIGN AND ANALYSIS OF ALGORITHMS**

SYLLABUS FOR B.E. IV-SEMESTER

L:T:P (Hrs./week):3:1:0	SEE Marks:60	Course Code: UII25PC440CS
Credits : 4	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVES		COURSE OUTCOMES <i>On completion of the course, students will be able to</i>	
1	Analyze the asymptotic performance of algorithms	1	Compare asymptotic behavior of functions derived from algorithms
2	Apply algorithm design strategies to solve science and engineering problems.	2	Apply divide & conquer and greedy algorithmic design paradigms to solve problems
		3	Design algorithms using Dynamic Programming strategy
		4	Design algorithms for problems using backtracking and branch & bound algorithm design techniques
		5	Identify the complexity class of a given problem

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	1											
CO2	3	3	3	1					1				2	1	1
CO3	3	3	3	1					1			1	2	1	1
CO4	2	2	3	1					1			1	2	1	1
CO5	2	2	2												

UNIT – I:**Introduction:** Introduction to Algorithm, algorithm specification.**Performance analysis:** Space complexity, time complexity. Asymptotic notations, amortized analysis, Masters theorem.**UNIT – II:****Divide and Conquer:** General method, Binary search, finding maximum and minimum, Merge sort, Quick sort, Expected Running Time of

Randomized Quick Sort, Strassen's Matrix Multiplication Algorithm, Karatsuba's large Integer Multiplication.

The Greedy Method: General method, Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees, Optimal Storage on Tapes, Optimal Merge Patterns, Single Source Shortest Path, Ford–Fulkerson algorithm for Maximum flow problem.

UNIT – III: Dynamic Programming: General method, Matrix-chain multiplication problem, Multistage graph, All Pairs Shortest Paths, Optimal Binary Search Trees (OBST), 0/1 Knapsack, Reliability Design, Traveling Salesman Problem, Bi-connected Components and DFS, Longest Common Subsequence (LCS) problem.

UNIT – IV:

Backtracking: General method, the 8-Queens Problem, Graph Coloring, Hamiltonian Cycles, Knapsack Problem.

Branch and Bound: The method, 0/1 Knapsack problem, Traveling Salesperson problem.

UNIT – V: NP-Hard and NP-Complete problems: Tractable and intractable problems, Non-Deterministic search and sorting, classes P, NP, NP-Complete, NP-Hard, Satisfiability (SAT), Cook's theorem, reductions, Procedure for NP-Complete, Clique Decision Problem, Traveling Salesperson problem, Approximation algorithm for Vertex Cover Problem, Set Cover Problem.

Learning Resources:

1. Ellis Horowitz, Sartaj Sahani, Sanguthevar Rajasekaran, " Fundamentals of computer Algorithms", Second edition (2008),Universities Press.
2. Thomas H. Cormen, Leiserson C.E, Rivest.R.L , Stein.C, Introduction to Algorithm, 2nd edition (2001), MIT press, USA.
3. Michael T. Goodrich, Roberto Tamassia, Algorithm Design, foundations, analysis, and internet examples, WILEY student edition (2006).
4. Aho, Hopcroft, Ulman, The Design and Analysis of Computer Algorithms, (2000), Pearson Education.
5. Algorithm Design, 1st Edition, Jon Kleinberg and ÉvaTardos, Pearson.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**

SYLLABUS FOR B.E. IV-SEMESTER

L:T:P(Hrs./week):3:0:0	SEE Marks:60	Course Code: UII25PC450CS
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVE	COURSE OUTCOMES
	On completion of the course, students will be able to
To formulate machine learning problems corresponding to an application.	1 Solve searching Problems using A* 2 Develop an algorithm for playing games and Solve problem with constraints. 3 Explain the basics of concept learning and inductive learning. 4 Design decision tree, neural network and support Vector Machine to solve classification problems. 5 Comprehend probabilistic methods for learning, cluster the data using K-means and classify the data using instance based learning . 6 Explain the instance based learning and reinforcement learning.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		2	1									1		2
CO2	2	2	2	2	2								1		3
CO3	3	2	3	2	2								2		3
CO4	3	2	2	2	1								2		3
CO5	3	2			2								2		3

UNIT-I:**Introduction:** Introduction to AI**Intelligent Agents:** The Structure of Agents

Solving Problems By Search: Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Depth-first search, Depth limited search, Iterative deepening depth first search, Informed (Heuristic) Search Strategies: Greedy best-

first search, A* Search: Minimizing the total estimated solution cost, Heuristic Functions, Local Search Algorithms and Optimization Problems.

UNIT-II:

Adversarial Search: Games, Optimal decisions in games, Alpha-Beta Pruning.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation : Node consistency, Arc consistency, Path consistency, K-consistency, Global constraints, Backtracking Search for CSPs : Variable and value ordering, Interleaving search and inference, Intelligent backtracking: Looking backward, Local Search for CSPs, The Structure of Problems.

UNIT-III:

Introduction to Machine Learning : Well-Posed Learning Problems, Designing a Learning System, Perspectives and Issues in Machine Learning, Types of Machine Learning.

The Concept Learning: A concept Learning Task, Concept learning as Search: General –to- Specific Ordering of Hypothesis, Find-S: Finding Maximally Specific Hypothesis, Version spaces and the CANDIDATE-ELIMINATION ALGORITHM: Representation, The List-Then-Eliminate Algorithm, Candidate Elimination Learning Algorithm

UNIT-IV:

Supervised Learning- Introduction, Classification Algorithms.

Decision Tree Learning: Introduction, Decision Tree Representation, Approximate Problems for Decision Tree Learning, The Basic Decision Tree Algorithm, Hypothesis space search in Decision Tree Learning, Issues in Decision Tree Learning.

Artificial Neural Networks: Introduction, Neural Network Representation, Perceptrons, Gradient descent and the Delta rule, Multilayer Networks and the Backpropagation Algorithm, Derivatives of back propagation rule. Back propagation algorithm- Convergence, Generalization.

Support Vector Machine.

UNIT-V:

Bayesian Learning: Introduction, Bayes Theorem, Concept Learning, Bayes Optimal Classifier, Naïve Bayes Classifier, Bayesian Belief networks.

Un Supervised Learning – Introduction, Clustering Algorithms- K means

Instance-based Learning: Introduction, k-Nearest Neighbor Learning, Locally Weighted Regressions, Radial Basis Functions, Case –based learning.

Learning Resources:

1. Tom Mitchell, —Machine Learning||, McGraw-Hill Science, First edition.
2. Christopher Bishop, —Pattern Recognition and Machine learning||, Springer (2006).
3. Stephen Marsland,||Machine Learning –an algorithmic perspective||, CRC Press.
4. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville, "Deep learning ", An MIT Press book in preparation (2015).
5. Daniela witten, Trevor Hastie Robert Tibshirani and Gareth James, —An introduction to statistical Learning with applications in R, Springer 2013
6. https://onlinecourses.nptel.ac.in/noc18_cs26/preview
7. <https://www.coursera.org/learn/machine-learning>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

OPEN ELECTIVES OFFERED IN B.E. IV SEMESTER (2026-27)

Dept	Title Open Elective-II	Code	Credits
CIVIL	Solid Waste Management	U25OE410CE	3
ECE	Sensors for Engineering Applications (General Pool)	U25OE410EC	3
	Modulation Theory and Techniques (General Pool)	U25OE420EC	3
	Modulation Theory and Techniques (Communication Engineering - Stream)	U25OE440EC	3
EEE	Mathematical Programming for Numerical Computation	U25OE410EE	3
MECH	Kinematics and Dynamics of Robotics (Stream: Robotics)	U25OE410ME	3
	Operations Research (General Pool)	U25OE420ME	3
H & SS	Finance Management for Engineers (Management Courses for Engineers – Stream)	U25OE410EH	3
	FINTECH (BFSI – Stream)	U25OE450EH	3
	Sociology (Liberal Arts Courses- Stream)	U25OE480EH	3
	Product Development and Validation (Stream: Entrepreneurship)	U25OE410EH	3
Maths	Estimation Theory and Statistical Inference	U25OE410MA	3
	Numerical Methods	U25OE420MA	3

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031**DEPARTMENT OF CIVIL ENGINEERING****SOLID WASTE MANAGEMENT****(Open Elective-II)**

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week):3:0:0	SEE Marks:60	Course Code: U25OE410CE
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
In this subject the students will	Upon the completion of this course students will be able to
1. Understand characteristics of solid waste and legislation of solid waste management. 2. Understand processing, collection and transportation of solid wastes. 3. Gain insight into transformation, energy recovery and disposal of solid waste. 4. Grasp the fundamentals of hazardous waste and its management. 5. Understand the solid waste management practices adopted actual practical scenarios.	1. Understand types, characteristics, composition of solid waste and rules laid for its management as per legislation. 2. Apply gained knowledge of waste reduction methods, collection techniques, resource recovery/ recycling, energy recovery, transport & transfer options for solid waste management. 3. Identify appropriate technologies for transformation and disposal of solid waste. 4. Categorize solid waste as hazardous or non- hazardous based on solid waste toxicology principles. 5. Analyze and apply solid waste management techniques in actual practice.

CO-PO and CO-PSO mapping												
CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1					2	3	2				
CO2						2	3					
CO3					2	2	3					
CO4						2	3					
CO5	2					2	3	3				

UNIT- I: Solid waste generation and material flow, sources and types of solid waste, characterization of solid waste, physical and chemical properties of solid waste, Hierarchy of solid waste management, solid waste management rules- 2016, Mathematical Modelling of Solid Waste.

UNIT- II: Storage of solid waste, Collection of Solid Waste: Primary and secondary collection, type of waste collection systems- Hauled and Stationary collection system, Waste handling and Processing: unit operations used for separation and processing, materials recovery, Transfer and Transport of solid waste, transfer station.

UNIT-III: Solid waste transformation :aerobic and anaerobic composting, combustion, Thermal conversion- Incineration and pyrolysis system, Gasification, RDF- recovery of energy from conversion products. Energy recovery systems, Solid waste disposal- Land farming, deep well injections, Landfills: Site selection, method, drainage and leachate collection systems, requirements and technical solutions.

UNIT-IV: Definition and identification of hazardous wastes, toxicology principles, sources and characteristics, hazardous wastes in Municipal Waste, Hazardous waste management, Introduction of Biomedical waste and E-waste, Hazardous waste regulations.

UNIT -V: Integrated solid waste management, Overview of solid waste management practices- National and International- Case studies, solid waste management practices adopted in industries- overview and case studies. Technological advancements in solid waste management.

Learning Resources:

1. Solid Waste Management: Foundations, Recycling Pathways, and Sustainable Practices Edition: 1st Edition, 2026 Editors: Zhao Youcai, Zhou Tao
2. Solid Waste Management Challenges and Recent Solutions, 1st Edition, 2025 Editors: Rajeev Pratap Singh et al. CRC Press (Taylor & Francis)
3. Solid Waste Management – Recent Advances, New Trends and Applications, 1st Edition, 2023 Intech Open (Open Access) Pengzhong Li Tongji University, China
4. Solid Waste and Landfills Management – Recent Advances, 1st edition, 2023, IntechOpen (Open Access), Subaiza Hanim Zailani, University of Malaya, Malaysia
5. P. A. Vesilind, Worrell W and Reinhart, "Solid Waste Engineering", Cengage Learning India Pvt. Ltd. 2nd Edition, 2016.
6. Tchobanoglous, "Integrated Solid Waste Management", Mc-Graw Hill International, 1st Edition, New York, 2014.
7. <https://archive.nptel.ac.in/courses/105/103/105103205/>

The break-up of CIE: Internal Tests+Assignments + Quizzes

1 No. of Internal Tests	: 2 Max. Marks for each Internal Test	: 30
2 No. of Assignments	: 3 Max. Marks for each Assignment	: 5
3 No. of Quizzes	: 3 Max. Marks for each Quiz Test	: 5
Duration of Internal Tests	: 90 Minutes	

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING****Sensors for Engineering Applications****(General Pool: Open Elective - II)**

SYLLABUS FOR B.E. IV - SEMESTER

(Civil, CSE, CSE (AIML) EEE, IT & Mech.)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U25OE410EC
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand Sensor Principles and Classification 2. Analyzing Sensor Characteristics and Response 3. Exploring Different Types of Sensors 4. Understanding Environmental Factors and Sensor Reliability 5. Explore the applications of sensors in various engineering fields	Upon completion of the course, students will be able to 1. Understand the fundamental principles of sensors and transducers and their importance in various engineering applications. 2. Demonstrate various mechanical sensors used for measuring displacement, acceleration, force, fluid flow, level, pressure, and stress. 3. Explain the working principles and applications of thermal and optical sensors. 4. Comprehend the principles and applications of magnetic sensors and acoustic sensors. 5. Explore electrical sensors, and high-frequency sensors and their use in various engineering applications.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1		1								1	1	
CO2	3	2	1		2								2	2	
CO3	2	2	2		2								2	2	
CO4	2	2	2		2								2	2	
CO5	2	2	2		2								2	2	

UNIT - I

Introduction to sensors and transducers. Need for sensors in the modern world. Different fields of sensors based on the stimuli - various schematics for active and passive sensors. Static and dynamic characteristics of sensors - zero, I, and II order

sensors – Response to impulse, step, ramp, and sinusoidal inputs. Environmental factors and reliability of sensors.

UNIT – II

Mechanical Sensors Displacement - acceleration and force – the flow of fluids - level indicators - pressure in fluids - stress in solids. Typical sensors - wire and film strain gauge, anemometers, piezoelectric and magneto strictive accelerometers, potential metric sensors, LVDT.

UNIT – III

Thermal and Optical Sensors temperature – temperature difference – heat quantity. Thermometers for different situations – thermocouples thermistors – color pyrometry. light intensity - wavelength and color - light dependent resistors, photodiode, phototransistor, CCD, CMOS sensors. Radiation intensity, particle counter – Gieger Muller counter (gas based), Hallide radiation detectors.

UNIT – IV

Magnetic and Acoustic Sensors magnetic field, magnetic flux density – magneto resistors, Hall sensors, superconducting squids. Intensity of sound, frequency of sound in various media, various forms of microphones, piezoelectric sensors.

UNIT – V

Electrical and High-Frequency Sensors conventional volt and ammeters, high current sensors, (current transformers), high voltage sensors, High power sensors. High frequency sensors like microwave frequency sensors, wavelength measuring sensors. MEMs and MEM based sensors.

Lab Experiments:

1. Measurement of displacement, and velocity with Pmod ACL with 3-axis Digital Accelerometer.
2. Sense the temperature with Pmod TMP3 with Ambient Temperature sensor.
3. Sense the ambient light with Pmod ALS with an Ambient light sensor.
4. Characteristics of photocell using myRIO with Photocell, API PDV-P9203.
5. Study of IR range sensor to measure the distance between the sensor and reflective target using IR range finder GP2Y0A21YK0F
6. Working principle of Hall effect using US1881 Hall-effect latch.
7. Study of acoustic sensor, to record audio signals and to monitor acoustic level using Chenyum CY-502 computer microphone.
8. Estimate the range for a given IR and ultrasonic sensor using QRB1134 IR sensors and MAXSONAR ultrasonic sensor.

Learning Resources :

1. Doebelin, "Measurement Systems: Application and Design", McGraw Hill Kogakusha Ltd.
2. Julian W. Gardner, Vijay K. Varadan, Osama O. Awadelkarim "Microsensors, MEMS and Smart Devices", New York: Wiley, 2001.
3. Henry Bolte, "Sensors – A Comprehensive Sensors", John Wiley.
4. Jacob Fraden, "Handbook of Modern Sensors, Physics, Designs, and Applications", Springer.
5. Manabendra Bhuyan, "Intelligent Instrumentation Principles and Applications", CRC Press.
6. Randy Frank, "Understanding Smart Sensors", Second edition, Artech House.

The break-up of CIE : Internal Tests + Assignments + Quizzes

- | | | | | | |
|--------------------------|---|--------------------------------|------------------------------------|---|---------------------------------|
| 1. No. of Internal Tests | : | <input type="text" value="2"/> | Max. Marks for each Internal Tests | : | <input type="text" value="30"/> |
| 2. No. of Assignments | : | <input type="text" value="3"/> | Max. Marks for each Assignment | : | <input type="text" value="5"/> |
| 3. No. of Quizzes | : | <input type="text" value="3"/> | Max. Marks for each Quiz Test | : | <input type="text" value="5"/> |

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING****Modulation Theory and Techniques****(General Pool: Open Elective - II)**

SYLLABUS FOR B.E. IV – SEMESTER (CSE, CSE(AIML) & IT branches)

L:T:P (Hrs./week): 3:0:0	SEE Marks: 60	Course Code: U25OE420EC
Credits: 3	CIE Marks: 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To Analyze different analog modulation techniques such as AM, DSB-SC, SSB, and VSB. 2. To explore Angle modulation and demodulation techniques. 3. To comprehend sampling and pulse modulation techniques. 4. To investigate digital transmission methods including ASK, FSK, and BPSK. 5. To Understand Information Theory and Source Coding.	On completion of the course, students will be able to 1. Analyze the power and transmission bandwidth of Amplitude and Frequency Modulated signals. 2. Familiarize the process of reproduction of base band signal. 3. Analyze various pulse analog and pulse digital Modulation Techniques. 4. Understand the transmission of binary data in communication systems. 5. Estimate information content in a system

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			2									3	
CO2	3	2			2									3	
CO3	3	2			2									3	
CO4	2	2			2									3	
CO5	2	3			2									3	

UNIT - I

Amplitude Modulation: Introduction to Modulation, Need for Modulation, Modulation index, Side bands, AM Power, Double Side Band Suppressed Carrier Modulation, Single Side Band Modulation, Vestigial Side Band Modulation, AM demodulation, Frequency Division Multiplexing,

Lab Activity: Generation of AM using MATLAB and Simulink.

UNIT - II

Angle Modulation: Angle Modulation fundamentals, Frequency Modulation – Modulation index and sidebands, Narrowband FM, Wideband FM, Principles of Phase Modulation, FM demodulation

Lab Activity: Generation of FM signals using MATLAB and Simulink.

UNIT - III

Signal Sampling and Analog Pulse Communication: Ideal Sampling, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation.

Digital Communication Techniques: Quantization, Data Conversion, Time Division Multiplexing, Pulse Code Modulation, Delta Modulation.

Lab Activity: Demonstration of Sampling using MATLAB.

UNIT - IV

Transmission of Binary Data in Communication Systems: Digital Codes, Principles of Digital Transmission, ASK FSK, BPSK

Lab activity: Demonstration of ASK and BPSK using SIMULINK.

UNIT - V

Information Theory: Uncertainty, Information and entropy. Discrete memory less channels

Source Coding Techniques: Shannon-Fano coding, Huffman Coding

Lab activity: Entropy calculations using MATLAB

Learning Resources:

1. Louis E. Frenzel, Principles of Electronic Communication Systems, 3rd Edition. Tata Mcgraw Hill.
2. Wayne Tomasi, Electronic Communications Systems, 5th Edition, Pearson Education.

The break-up of CIE : Internal Tests + Assignments + Quizzes

- | | | | |
|--------------------------|-----|------------------------------------|------|
| 1. No. of Internal Tests | : 2 | Max. Marks for each Internal Tests | : 30 |
| 2. No. of Assignments | : 3 | Max. Marks for each Assignment | : 5 |
| 3. No. of Quizzes | : 3 | Max. Marks for each Quiz Test | : 5 |

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING****Modulation Theory and Techniques****(Communication Engineering Stream: Open Elective - II)**

SYLLABUS FOR B.E. IV – SEMESTER (CSE & IT branches)

L:T:P (Hrs./week): 3:0:0	SEE Marks: 60	Course Code: U250E440EC
Credits: 3	CIE Marks: 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To Analyze different analog modulation techniques such as AM, DSB-SC, SSB, and VSB. 2. To explore Angle modulation and demodulation techniques. 3. To comprehend sampling and pulse modulation techniques. 4. To investigate digital transmission methods including ASK, FSK, and BPSK. 5. To Understand Information Theory and Source Coding.	On completion of the course, students will be able to 1. Analyze the power and transmission bandwidth of Amplitude and Frequency Modulated signals. 2. Familiarize the process of reproduction of base band signal. 3. Analyze various pulse analog and pulse digital Modulation Techniques. 4. Understand the transmission of binary data in communication systems. 5. Estimate information content in a system

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			2									3	
CO2	3	2			2									3	
CO3	3	2			2									3	
CO4	2	2			2									3	
CO5	2	3			2									3	

UNIT - I

Amplitude Modulation: Introduction to Modulation, Need for Modulation, Modulation index, Side bands, AM Power, Double Side Band Suppressed Carrier Modulation, Single Side Band Modulation, Vestigial Side Band Modulation, AM demodulation, Frequency Division Multiplexing,

Lab Activity: Generation of AM using MATLAB and Simulink.

UNIT - II

Angle Modulation: Angle Modulation fundamentals, Frequency Modulation – Modulation index and sidebands, Narrowband FM, Wideband

FM, Principles of Phase Modulation, FM demodulation

Lab Activity: Generation of FM signals using MATLAB and Simulink.

UNIT - III

Signal Sampling and Analog Pulse Communication: Ideal Sampling, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation.

Digital Communication Techniques: Quantization, Data Conversion, Time Division Multiplexing, Pulse Code Modulation, Delta Modulation.

Lab Activity: Demonstration of Sampling using MATLAB.

UNIT - IV

Transmission of Binary Data in Communication Systems: Digital Codes, Principles of Digital Transmission, ASK FSK, BPSK

Lab activity: Demonstration of ASK and BPSK using SIMULINK.

UNIT - V

Information Theory: Uncertainty, Information and entropy. Discrete memory less channels

Source Coding Techniques: Shannon-Fano coding, Huffman Coding

Lab activity: Entropy calculations using MATLAB

Learning Resources:

1. Louis E. Frenzel, Principles of Electronic Communication Systems, 3rd Edition. Tata Mcgraw Hill.
2. Wayne Tomasi, Electronic Communications Systems, 5th Edition, Pearson Education.

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Tests	: 30
2. No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**MATHEMATICAL PROGRAMMING FOR NUMERICAL COMPUTATION****Open Elective-II****SYLLABUS FOR B.E. IV SEMESTER**

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U25OE410EE
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	On completion of the course, students will be able to
To provide fundamental knowledge of programming language for solving problems.	On completion of the course, students will be able to 1. Generate arrays and matrices for numerical problems solving. 2. Represent data and solution in graphical display. 3. Write scripts and functions to easily execute series of tasks in problem solving. 4. Use arrays, matrices and functions in Engineering applications 5. Design GUI for basic mathematical applications.

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

UNIT - I : Introduction:

Basics of MATLAB, MATLAB windows, Advantages of MATLAB, on-line help, file types.

MATLAB Basics: Variables and Constants – Vectors and Matrices- Arrays - manipulation- Built-in MATLAB Functions. Creating and printing simple

plots, Creating ,Saving and Executing a Script File, Creating and Executing a function file.

Programming Basics: Data types-Operators – Hierarchy of operations, Relational and logical operators, if-end structure, if- else-end structure, if-elseif-else-end structure, switch-case statement, for-end loop, while-end loop, break and continue commands.

UNIT - II : Scripts and Functions

Script Files, Function Files, Debugging methods in MATLAB. **Graphics:**

Basic 2D plots: Printing labels- grid and axes box- Entering text in a box- Axis control-Style options-Multiple plots- subplots-specialized 2D plots:stem-, bar, hist, pi, stairs, loglog , semilog ,polar ,comet 3D plots: Mesh,Contour,Surf,Stem3,ezplot.

UNIT - III : Numerical Methods Using MATLAB

Numerical Differentiation, Numerical integration- Newton-Cotes integration formulae, Multi-step application of Trapezoidal rule, Simpson's 1/3 Rule for Numerical Integration. MATLAB functions for integration.

Linear Equations- Linear algebra in MATLAB, Solving a linear system, Gauss Elimination, Finding eigen values and eigen vectors, Matrix factorizations, Advanced topics.

UNIT - IV : Nonlinear Equations

System of Non-linear equations, Solving System of Equations Using MATLAB function fsolve, Interpolation-Lagrange Interpolation, Two dimensional Interpolation, Straight line fit using Least Square Method, Curve fitting using built-in functions ployval and polyfit , cubic fit using least square method. Finding roots of a polynomial - roots function, Newton-Raphson Method.

UNIT - V :

Solution of Ordinary differential Equations(ODEs)-The 4th order Runge-kutta Method, ODE Solvers in MATLAB,Solving First – order equations using ODE23 and ODE45.

Structures and Graphical user interface(GUI):Advanced data Objects, How a GUI works, Creating and displaying a GUI. GUI components, Dialog Boxes.

Learning Resources:

1. Getting started with MATLAB "A quick introduction for scientist and engineers by RudraPratap, Oxfordpublications.
2. Advanced Guide to MATLAB-Practical Examples in Science and Engineering by S.N.Alam, S.Islam, S.K. Patel-I.K. International Publishing House Pvt.Ltd.
3. Stephen J. Chapman-"MATLAB Programming for Engineers"- 5th

Edition- Cengage Learning- 2015. Getting started with MATLAB (Version 9) The Mathworks.

4. An Introduction to MATLAB® Programming and Numerical Methods for Engineers 1st Edition by Timmy Siauwx Alexandre Bayen, Elsevier - 18th April2014.
5. <https://nptel.ac.in/courses/103106118/2>

The break-up of CIE: Internal Tests+Assignments+Quizzes

- | | | | | | |
|--------------------------|---|--------------------------------|-----------------------------------|---|---------------------------------|
| 1. No. of Internal Tests | : | <input type="text" value="2"/> | Max. Marks for each Internal Test | : | <input type="text" value="30"/> |
| 2. No. of Assignments | : | <input type="text" value="3"/> | Max. Marks for each Assignment | : | <input type="text" value="5"/> |
| 3. No. of Quizzes | : | <input type="text" value="3"/> | Max. Marks for each Quiz Test | : | <input type="text" value="5"/> |
- Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING**Kinematics and Dynamics of Robotics****(Stream: Robotics)**

(Open Elective-II)

SYLLABUS FOR B.E. IV – SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U25OE410ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVE	COURSE OUTCOMES
The objective of the course is to	On completion of the course, students will be able to
To develop the fundamental knowledge and skills required to analyze, design and control robotic systems	1. Analyze the kinematics of robotic systems and apply them to solve real world problems 2. Apply differential kinematics and statics concepts to design and control robotic systems 3. Analyze the dynamics of serial manipulators using lagrangian method. 4. Analyze the dynamics of serial manipulators using lagrangian and Newton-Euler mechanics 5. Generate and analyze robot trajectories for various applications

CO-PO and CO-PSO mapping																
CO	PO mapping												PSO mapping			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2	2	2			2			2	2		2	3	2	1	
CO2	2	2	2			2			2	2		2	3	2	1	
CO3	3	3	3			3			3	3		2	3	2	1	
CO4	3	2	2		3	3		3	2	2	3	3	3	2	1	
CO5	2	2	2		2	2		2	2	2	2	2	3	2	1	

UNIT-I**Robot Kinematics**

Forward Kinematics: Forward/direct kinematic analysis of serial manipulators.

Inverse Kinematics: General properties of inverse kinematic solution. Inverse kinematics of serial manipulators.

UNIT-II**Differential Kinematics**

Linear and angular velocity of links, Manipulator Jacobian for serial manipulators, Jacobian Singularities.

UNIT-III

Static Analysis: Force and moment balance.

Dynamics of serial manipulators

Lagrangian formulation for equations of motion for RP, RR serial manipulators,

Unit-IV

Dynamics of serial manipulators

Recursive dynamics using Newton-Euler formulation of RP and RR serial manipulator.

UNIT-V

Trajectory Generation

Joint-Space Techniques: Cubic Polynomial Trajectories, Linear Segments with Parabolic Blends-without and with via points

Cartesian-Space Techniques: Straight line path, Circular Path, Position Planning, Orientation Planning.

Learning Resources:

1. Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo, "Robotics: Modelling, Planning and Control", Springer Science & Business Media, 2010.
2. M.W.Spong and M.Vidyasagar, "Robot Dynamics and Control", 1st Edition, John Wiley and sons, 1990.
3. R.K.Mittal and I.J.Nagrath, "Robotics and Control", Tata McGraw-Hill, 2003.
4. Subir Kumar Saha, "Introduction to Robotics", Tata McGraw-Hill Education, 2014.
5. Howie M. Choset, Seth Hutchinson, Kevin M. Lynch, "Principles of Robot Motion: Theory, Algorithms, and Implementation", MIT Press, 2005.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05
Duration of Internal Test: 90 Minutes				

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING**OPERATIONS RESEARCH**

(General Pool : Open Elective-II)

SYLLABUS FOR B.E. IV-SEMESTER

Instruction: 3Hrs/week	SEE Marks : 60	Course Code: U25OE420ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of this course are to: understand the application of mathematics for real time problem solving to LPP, sensitivity analysis under set of constraints, applying mathematical techniques to solve transportation problem and assignment problems, applying time value money and ignoring the same to find the optimal replacement of machines, applying Johnsons rules to find the best sequence to minimize elapsed time and minimum no of servers to minimize waiting time of the customers and optimal utilisation of servers.	On completion of the course, the student will be able to: 1. Apply optimization in multidisciplinary areas through linear programming under different working conditions. 2. Analyze linear programming for a dynamic changes of a customer requirements to suit various Organizations. 3. Reduce total cost to apply for transportation techniques for the transshipment of Goods and products for a product based industry. 4. Estimate the time for replacement of a machine by considering or ignoring time value of money using individual/group replacement policy. 5. Estimate elapsed time for sequencing problem processed through different machines. Minimize waiting time of the customer and optimization of no. of servers.

CO-PO and CO-PSO mapping															
CO	PO mapping												PSO mapping		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	3	2	1	2				1	2		2	1	2	1
CO2	1	3	2	1					1	2		2	1	2	1
CO3	1	3	2	2	1				1	2		2	1	2	1
CO4	1	3	2	1					1	2		2	1	2	1
CO5	1	3	2	2	1				1	2		2	1	2	1

UNIT – I

Introduction: Definition and scope of operations research.

Linear programming: Introduction, Formulation of linear programming problems, graphical method of solving LP problem, Simplex method, maximization and minimization, degeneracy in LPP, unbounded and infeasible solutions. Introduction of software to solve LPP.

UNIT – II

Duality: Definition, Relationship between optimal primal and dual solutions. Economic interpretation, Post optimal analysis (restricted to variation of resources i.e., RHS), Dual simplex method.

Transportation model: Finding an initial feasible solution– north west corner method, least cost method, Vogel’s approximation method, finding the optimal solution, optimal solution by stepping stone and MODI method, special cases in transportation problems – Unbalanced transportation problem.

UNIT-III

Assignment Problem: Hungarian method of assignment problem, maximization in assignment problem, unbalanced problem, problems with restrictions, travelling salesman problem.

Replacement models: Introduction, Replacement of items that deteriorate ignoring change in money value, replacement of items that deteriorate considering change in money value with time, replacement of items that fail suddenly – individual replacement policy, group replacement policy.

UNIT-IV

Game theory: Introduction, 2 person zero sum games, maximin– minimax principle, principle of dominance, solution for mixed strategy problems graphical method for $2 \times n$ and $m \times 2$ games.

UNIT-V

Sequencing models: Introduction, General assumptions, processing n jobs through 2 machines, processing n jobs through m machines processing 2 jobs through n machines.

Queuing theory: Introduction, Single channel – Poisson arrivals – exponential service times with infinite population and finite population.

Learning Resources:

1.Hamady A. Taha, "Operations Research – An introduction", 6th Edition, PHI Pvt. Ltd., 1997.

- 2.S.D. Sharma, "Operations Research", Kedarnath, Ramnath & Co., Meerut, 2009.
- 3.Harvey M. Wagner, "Principles of Operations Research", 2nd Edition, PHI Pvt. Ltd., 1980.
- 4.V.K. Kapoor, "Operations Research", S. Chand Publishers, New Delhi, 2004.
- 5.S.S. Rao, "Engineering Optimization – Theory and Practice", 4th Edition, John Wiley & Sons Inc., 2009.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05
Duration of Internal Test: 90 Minutes				

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

FINANCE MANAGEMENT FOR ENGINEERS
(Stream: Management Course for Engineers)
(Open Elective-II)
SYLLABUS FOR B.E. - IV Semester

Instruction : 3 Hours	SEE : 60	Course code : U25OE410EH
Credits : 3	CIE : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES The course will enable the learners to:	COURSE OUTCOMES At the end of the course the learners will be able to: -
1. To introduce basic principles of finance and accounting relevant to engineering. 2. To develop the ability to interpret financial statements and assess financial performance. 3. To equip students with tools for cost estimation, budgeting, and financial planning in projects. 4. To familiarize students with concepts of investment analysis and capital budgeting. 5. To enable understanding of economic feasibility and risk analysis in engineering decisions.	1. Understand and apply basic financial terminology, concepts, and statements. 2. Analyze and interpret balance sheets, income statements, and cash flow reports. 3. Estimate project costs, prepare budgets, and conduct break-even analysis. 4. Evaluate investment options using NPV, IRR, and payback period methods. 5. Assess the financial viability and risks of engineering projects and make informed decisions.

CO-PO mapping												
CO/ PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1				1							3	3
CO2				1							3	3
CO3				1							3	3
CO4				1							3	3
CO5				1							3	3

Unit-I: Introduction

Why Finance – Difference between finance and accounts – Role of finance in contemporary business – Goals of financial management – Risk Return Trade off – Time Value of Money (Simple numerical problems on PV and FV) - BS, P&L, CF (Only structure) – Components and importance – diff between capex and opex.

Unit-II: Sources of Finance

Sources of fin Information – Company Annual Reports, Government (Budget highlights), Analysts and Regulators (RBI and SEBI only) - Debt Vs Equity – Effect of Leverage – Measurement of Cost of Debt and Equity- WACC- (Simple Numerical Problems on Cost of Debt)

Unit-III: Financial Performance Assessment (MS Excel Based)

Ratio Analysis – Activity, Liquidity and Profitability Ratios – Comparing with Industry average and interpret the results - Financial Modelling – Concept, Types. Creating Capital Structure Model Using MS Excel with given data.

Unit - IV: Project Finance

Importance of Project Finance - Project Cost and Means of Finance - Contents of a Project Report – Technical and Environmental Aspects – Commercial and Financial Viability - Projected Financials, Sensitivity Analysis – Replacement Projects.

Unit-V: International Finance (Only Theory)

Difference between Domestic and International Finance - Currency exchange Rates regimes- Factors affecting currency exchange rates-Spot and Forward Rates - Currency Forwards, Futures and Swaps - Components of Balance of Payments.

Prescribed Text Books :

Financial Management, I M Pandey, Pearson Ed, ISBN 9789390577255

Financial Management - Theory, Concepts and Problems, R P Rustagi, Taxmann Publications.

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2. No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3. No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031**DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES****FINTECH****(Stream: BFSI)****(Open Elective-II)****SYLLABUS FOR B.E. - IV Semester**

Instruction : 3.0.0	SEE : 60	Course code : U25OE450EH
Credits : 3	CIE : 40	Duration of SEE : 3 Hours

Course Objectives: By the end of the course, learners will be able to:	Course Outcomes: On completion of the course, learners will be able to:
- To gain understanding of structure of financial markets - To gain understanding of Risks and Return in financial markets - To understand the concepts and applications of Fintech - To understand the Payments and Settlements system - To gain understanding of Crypto Currencies	- Differentiate between capital and money market. - Measure risk in financial markets. - Identify the interaction between banking services and Technology. - To understand the players Payments and Settlements. - Differentiate between various types of crypto currencies

CO-PO mapping												
CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1					1			2			3	3
CO2					1			2			3	3
CO3					1			2			3	3

UNIT 1 (8 HOURS) OVERVIEW OF FINTECH

Overview of Fintech: Concept – Meaning – Evolution of Fintech - Significance – Drivers of fintech – Areas of Fintech – Fintech Opportunities and Challenges – Keyplayers in the Fintech ecosystem - Recent Developments in Fintech

UNIT 2 (6 HOURS) FINTECH IN BANKS

Fintech in Banks – Traditional Vs Digital Banks- Neo Banks – Use of technology for banking operations like KYC, lending, real time access to bank accounts- fraud detection - Chatbots in Banking – Benefits of Fintech in Banking- RBI guidelines on Fintech in Banking.

UNIT 3 (7 HOURS) OPEN BANKING

Definition- Difference between Open banking and conventional banking – Evolution of Open Banking Technology – Driving forces of Open banking – Benefits of Open Banking – Challenges of Open Banking - Key players – Components – Role of APIs - Working framework of Open Banking – Standards in Open Banking - Use cases in Open Banking

UNIT 4 (10 HOURS) PAYMENT SYSTEMS

Payment systems- concept and importance – Technology adoption in payment systems- Settlement Systems – Concept – Technology in Settlement systems – Players in Payments and Settlement Systems- Study of RBI's UPI and IMPS – Regtech Ecosystem.

UNIT 5 (5 HOURS) DIGITAL CURRENCIES

Digital Currencies – Concept of Crypto currency - Use of Blockchain and other technologies in Digital currency- Central Bank Digital Currencies – Concept – Use cases – Advantages and Disadvantages of CBDCs- Digital wallets Vs.Digital currencies. Use cases like AmazonPay, Whatsapp Pay etc

Assignments

Students to do a study on various players in the Fintech Ecosystem

Student to take up one UPI platform and present a report linking Open banking and the eco system

LEARNING RESOURCES

Text Books:

Rajiv Shrivastava and Anil Misra, 'Financial Management', Oxford Higher Education (Units 1&2)

Sofie Blakstad, 'Fintech Revolution', Palgrave Macmillan.

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2. No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3. No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

SOCIOLOGY
(Open Elective-II)
SYLLABUS FOR B.E. - IV Semester

Instruction : 2 Hours	SEE : 60	Course code : U25OE480EH
Credits : 3	CIE : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES The course will enable the learners to:	COURSE OUTCOMES On completion of the course, learners will be able to:
1. To introduce students to the origin, development, nature, scope, and significance of Sociology as a social science. 2. To familiarize students with basic sociological concepts such as social structure, social stratification, social groups, institutions, culture, family, caste, polity, and economy. 3. To develop an understanding of the process of socialization, agencies of socialization, social control, and the role of digital media in shaping social behaviour. 4. To examine the nature, factors, and types of social change with special reference to globalization, digitalization, sustainability, and social movements. 5. To provide foundational knowledge of Digital Sociology, including the impact of artificial intelligence, digital platforms, social bias, and digital activism on contemporary society.	1. Explain the historical development, scope, significance, and major concepts of Sociology. 2. Analyze the relationship between individual and society and understand the structure and functioning of social institutions. 3. Describe the process of socialization and evaluate the influence of family, education, media, and digital technologies on social behaviour. 4. Examine the causes and consequences of social change, including the role of digital media, technology, and social movements in contemporary society. 5. Understand the emergence of Digital Sociology and critically assess issues related to AI, digital inequality, social bias, and online social movements.

CO-PO mapping												
CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1						3		1				3
CO2						3		1				3
CO3						3		1				3
CO4						3		1				3
CO5						3		1				3

UNIT-I: Defining Sociology

- 1: Genesis of Sociology: History, Context and Evolution
- 2: Nature, Scope and Significance of Sociology
- 3: Relationship between Individual and Society
- 4: Meaning and Characteristics of Social Structure, Social Stratification, Social Interaction,
Social Inequalities

UNIT-II: Basic Concepts

- 4: Social Groups, Community, Society, Associations, and Institutions, Status and Role
- 5: Family, Marriage, Culture, Religion and Kinship
- 6: Caste, Polity, State, Education and Economy

UNIT-III: Socialization

- 7: Meaning and Significance of Socialization
- 8: Agencies of Socialization
- 9: Social Control
- 10: Digital Socialisation

UNIT-IV: Social Change

- 15: Meaning and Characteristics of Social Change
- 16: Factors of Social Change (Digitality and Social Media)
- 17: Types of Social Change
- 18: Social Change in a Digital world
- 19: Movements against Inequalities, Climate Change and Sustainability

UNIT-V: Introduction to Digital Sociology

- 20: Meaning and Characteristics of Digital Sociology
- 21: Factors and Emergence
- 22: AI and Social Bias
- 23: Digital World and Social Movements

LEARNING RESOURCES:-

Textbooks:-

- Principles of Sociology with an Introduction to Social Thought - Book by C N Shankar Rao
- Sociology: Themes and Perspectives - Textbook by Martin Holborn and Michael Haralambos
- Lupton, Deborah. 2014. Digital Sociology. New York: Routledge.

- Dr. Mohammed Shahid, Impact of Liberalization, Privatization, and Globalization (LPG) on the Indian Economy, pg: 175-180.
<https://dx.doi.org/10.47772/IJRISS.2025.90600013>

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2. No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3. No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES**Product Development and Validation**

(Stream: Entrepreneurship) (Open Elective - II)

SYLLABUS FOR B.E. IV SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U250E410EH
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVE The objective of the course is to:	COURSE OUTCOMES On completion of the course, students will be able to:
1. Apply design thinking to identify and solve real-world problems. 2. Build and refine prototypes and MVPs using iterative methods. 3. Validate ideas through customer feedback and market testing. 4. Understand legal, marketing, and strategic aspects of product launch.	1. Apply design thinking to frame problems and generate solutions. 2. Build and iterate MVPs using prototyping tools. 3. Validate ideas through user feedback and market insights. 4. Assess legal, marketing, and launch strategies for a product.

CO-PO and CO-PSO mapping														
CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	1	2	2	2				2		1			1	
CO2	1	2	2					2		1		1		1
CO3		1			1			2	1					
CO4													1	
AVG.	1	1.7	2	2	1			2	1	1		1	1	1

UNIT-I Design Thinking and Innovation

Design Thinking Methodology: Empathize, Define, Ideate, Prototype, Test
Techniques for Fostering Innovation Empathy Mapping, User Personas, and Problem Identification Creative Ideation and Brainstorming Techniques Case Studies of Innovation (e.g., IDEO, Airbnb, Apple)

UNIT-II Prototyping and MVP Development Types of Prototypes: Low-fidelity vs. High-fidelity, Steps to Create a Minimum Viable Product (MVP), Prototyping Tools (Figma, Adobe XD, Balsamiq), Agile and Lean Methods in MVP Development, User-Centered and Iterative Design Processes, Wireframes, Usability Testing, and Mockups

UNIT-III Customer Validation

Introduction to Customer Discovery and Validation, Conducting Effective Customer Interviews, Designing and Distributing Surveys (Google Forms, Typeform), Analyzing Feedback: Qualitative and Quantitative Methods, Iterative Product Refinement Based on Feedback, Tools for Customer Insight and Behavior Analysis

UNIT-IV Market Testing and Product Launch

Early Market Entry Strategies, Beta Testing and Market Feedback Loops, Pivoting and Iteration Based on Market Response, Digital Marketing Techniques: SEO, SEM, Social Media, Product Launch Strategies and Go-to-Market Planning, Distribution Channels and Customer Acquisition, Basics of digital marketing and branding, Sales strategies and negotiation techniques, Operational challenges and logistics, Growth strategies and market expansion

UNIT-V Legal and Strategic Considerations

Intellectual Property Rights: Patents, Copyrights, Trademarks, Regulatory Compliance and Industry Standards, Choosing the Right Legal Structure for Startups, Product Liability and Risk Management, Performance Monitoring and Key Metrics (NPS, Retention, Churn), Post-launch Support and Strategic Planning

Learning Resources:

1. The Lean Startup – Eric Ries, Crown Business (2011)
2. Business Model Generation – Alexander Osterwalder & Yves Pigneur, Wiley (2010)
3. New Product Development – P. Gopalkrishnan & V.E. Rama Moorthy, New Age International Publishers (1997)
4. The Mom Test – Rob Fitzpatrick, Robfitz Ltd. (2013)
5. Sprint – Jake Knapp with John Zeratsky & Braden Kowitz, Simon & Schuster (2016)
6. Change by Design – Tim Brown, HarperBusiness (2009)

The break-up of CIE: Internal Tests+Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05
Duration of Internal Test: 90 Minutes				

VASAVI COLLEGE OF ENGINEERING (Autonomous)ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031**DEPARTMENT OF MATHEMATICS****ESTIMATION THEORY AND STATISTICAL INFERENCE****(Open Elective-II)**

SYLLABUS FOR B.E.IV-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U25OE410MA
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
<i>The course will enable the students to :</i>	<i>At the end of the course students should be able to:</i>
1. Study the concepts and application of sampling distribution 2. Describe the role of the point estimation, interval estimation and Bayesian estimation about a parameter. 3. Study various methods of testing large samples. 4. Analyze standard statistical tests employed for small samples. 5. Study the difference between non-parametric and parametric tests.	1. Apply Central Limit Theorem to the real-world problems and calculate and interpret, in testing one sample mean (σ known). 2. Apply various estimators for estimating the parameters of standard distributions. 3. Infer properties of population conducting tests on samples 4. Interpret planned and unplanned comparisons for the one-way ANOVA. 5. Solve problems on the Sign test, Wilcoxon Signed test, Mann-Whitney U-test.

UNIT – I: (8 Hours)**SAMPLING DISTRIBUTION**

Sampling distribution of Mean (σ known)-Sampling distribution of Mean (σ unknown)-Sampling distribution of the Variance-Sampling distribution of differences and sums- Central Limit Theorem and its applications.

UNIT – II: (7 Hours)**ESTIMATION**

Introduction- Point estimation- Interval estimation- Bayesian estimation.

UNIT – III: (7 Hours)

TESTING OF HYPOTHESIS FOR LARGE SAMPLES

Introduction -Test of significance for single proportion-Test of significance for two proportions-Standard deviation tests for two samples.

UNIT – IV: (7 Hours)

TESTING OF HYPOTHESIS FOR SMALL SAMPLES

Introduction- Paired Sample t-test- Chi- square test for independence of attributes- Analysis of Variance (ANOVA)

UNIT – V: (7 Hours)

NON-PARAMETRIC TESTS

The Sign test- Wilcoxon Signed Rank test- Mann-Whitney U- test.

Text Books:

1. Miller & Freund's Probability and Statistics for Engineers.
2. Fundamentals of Mathematical Statistics, Gupta & Kapoor, Sultan chand & sons, New Delhi.
3. Applied Statistics and Probability for Engineers by Douglas C. Montgomery and George C. N Runger, International Student Version, 6th Edition, 1 January 2016.

Reference Books:

- 1 R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Third Edition, Narosa Publications, 2007.
- 2 Higher Engineering Mathematics, Dr.B. S Grewal 40th Edition, Khanna Publishers.
- 3 Advanced Engineering Mathematics, Kreyszig E, 8th Edition, John Wiley & Sons Ltd, 2006.
- 4 A text book of Engineering Mathematics by N.P. Bali& Manish Goyal, Laxmi Publication.

Online Resources:

https://onlinecourses.nptel.ac.in/noc24_ma39/preview

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
4	Duration of Internal	:	90 Minutes			

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MATHEMATICS**NUMERICAL METHODS****(Open Elective-II)****SYLLABUS FOR B.E.IV-SEMESTER**

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U25OE420MA
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	At the end of the course students will be able to:
Study various numerical methods to solve Algebraic and Transcendental equations. Learn the methods to solve linear system of equations. Understand the numerical methods in interpolation and extrapolation. Understand the numerical methods in interpolation using central differences. Understand numerical methods in solving ordinary differential equations.	Apply numerical methods to solve Algebraic and Transcendental equations which cannot be solved by traditional algebraic methods Solve linear system of equations using direct and iteration methods. Use various numerical methods in interpolation and extrapolation. Implement various numerical methods in interpolation using central differences. Find numerical solutions of ordinary differential equations.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2										1	3	2	
CO2	3	2										1	3	2	
CO3	3	2										1	3	2	
CO4	3	2										1	3	2	
CO5	3	2										1	3	2	

UNIT – I: (8 Hours)

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS:

Algebraic and Transcendental equations: Bisection method - Newton-Raphson method - Regula-Falsi method.

UNIT – II: (8 Hours)

SOLUTION OF SYSTEM OF LINEAR EQUATIONS:

Direct methods - Gauss elimination method - Factorization method - Iterative methods: Jacobi's method – Gauss-Seidel method - Ill-conditioned system of equations.

UNIT – III: (8 Hours)

NUMERICAL DIFFERENCES - I

Introduction to finite differences - Interpolation- Newton's Forward and Backward Interpolation Formulae - Interpolation with unequal intervals - Lagrange's Interpolation Formula - Divided differences - Newton's divided difference formula.

UNIT – IV: (8 Hours)

NUMERICAL DIFFERENCES - II

Central differences interpolation - Gauss's forwards and backward difference formulae - Stirling's formula - Bessel's formula.

UNIT – V: (8 Hours)

NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS

Numerical Solutions of Ordinary Differential Equations: Taylor's Series Method - Euler's Method - Modified Euler's Method – Runge-Kutta of 4th order (without proofs).

Text Books:

1. Numerical methods in engineering and science by B.S.Grewal, Khanna publishers
2. Advanced Engineering Mathematics by R.K.Jain & S.R.K.Iyengar, Narosa publishing house.

Reference Books:

1. Numerical Analysis by S.S.Sastry, PHI Ltd.

Online Resources:

https://onlinecourses.swayam2.ac.in/cec25_ma19/preview

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2. No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3. No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Test: 90 Minutes

UNIT 1

QUANTITATIVE APTITUDE- ARITHMETIC ABILITY ADVANCED -1

- 1.1 Time speed and distance
- 1.2 Boats and Streams
- 1.3 Problems on trains

UNIT 2

REASONING ABILITY- LOGICAL REASONING

- 2.1 Seating Arrangements- Linear; Circular; Complex
- 2.2 Venn diagrams
- 2.3 Syllogism
- 2.4 Cubes & Cuboids
- 2.5 Dices

UNIT 3

REASONING ABILITY- NON VERBAL REASONING

- 3.1 Figure Series
- 3.2 Directions
- 3.3 Clocks
- 3.4 Calendars

UNIT 4

QUANTITATIVE APTITUDE- ARITHMETIC ABILITY ADVANCED -2

- 4.1 Mensuration Part -1
- 4.2 Mensuration Part -2
- 4.3 Logarithms

Prescribed textbook for theory:

- 1. Quantitative Aptitude S.CHAND by RS AGARWAL
- 2. A Modern Approach to Verbal & Non-Verbal Reasoning S.CHAND by Dr. R S Aggarwal

Suggested Reading

- 1. Learn.talentsprint.com/References Courses
- 2. Quantitative Aptitude Disha Publications
- 3. LOGICAL Reasoning Disha Publications

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal tests	:	2	Max. Marks	:	20
2	No. of assignments	:	2	Max. Marks	:	5
3	No. of Quizzes	:	2	Max. Marks	:	5
Duration of Internal Tests		:	90 Minutes			

VASAVI COLLEGE OF ENGINEERING(Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering**Skill Development Course-VI (Technical Skills-IV)****Problem Solving through Data Structures**

SYLLABUS FOR B.E. IV-SEMESTER

L:T:P (Hrs./week):1:0:0	SEE Marks:40	Course Code: UII25PE410CS
Credits : 1	CIE Marks:30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1. Understand the Nonlinear data structures and their applications. 2. Prepare the students for the contests relative to the concepts learnt. 3. Build confidence in coding using Non Linear Data structures 4. Leverage the Industry Standards of the DBMS concepts	1. Learn non-linear data structures with various applications that are essential for solving problems which involve complex relationships, efficient searching, and hierarchical organization. 2. Solve scenario based problems using Tree Data structures 3. Learn and apply greedy algorithms for efficient solutions to complex problems. 4. Learn and apply database concepts for designing efficient, reliable, and well-structured databases that meet the needs of modern applications.

CO-PO mapping												
CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	2	1	-	-	-	-	-	-	-	2
CO2	3	3	2	1	-	-	-	-	-	-	-	2
CO3	3	3	2	1	-	-	-	-	-	-	-	2
CO4	3	3	2	1	-	-	-	-	-	-	-	2

Problem Solving through Non-Linear Data structures – Trees I

Problem solving approaches using Non-linear data structures, Coding problems on the height of a binary tree, Size of a binary tree, Tree order traversals, Problem Solving on Binary Trees, Examples, Practice problems.

Problem Solving through Non-Linear Data structures – Trees II

Time comparison and analysis on Binary Search Trees & Coding problems, Search/probe sequence validation, Significance of height balancing the tree, Examples, Practice problems.

Problem Solving implementing Algorithms - Greedy Methods II

Algorithmic Thinking, Selection as Greedy Strategy, Heaps Min and Max, Priority Queues, Greedy Coin change solution, Examples, Practice problems.

Problem Solving implementing Algorithms - Greedy Methods II

Fractional Knapsack, Sequencing jobs with deadlines, Activity selection, Examples, Practice problems.

Problem Solving using DBMS I

Industry Standards of leveraging DBMS concepts: SQL Queries, Entity Relationship Models, Question, and answers.

Problem Solving using DBMS II

Industry Standards of leveraging DBMS concepts: Query Optimization, Transactions & Concurrency, Normalization, case studies, Question and answers

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	1	Max. Marks for each Internal Test	:	20
2	No. Quizzes	:	1	Max. Marks for each Quiz	:	10

Duration of Internal Tests : 1 Hour 30 Minutes

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Department of Computer Science & Engineering**DATABASE MANAGEMENT SYSTEMS LAB**

SYLLABUS FOR B.E. IV-SEMESTER

L:T:P (Hrs./week):0:0:2	SEE Marks:50	Course Code: UII25PC421CS
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1 Apply SQL commands on a database. 2 Develop an application using forms, reports and PL/SQL.	1 Design and implement a database schema. 2 Apply DDL, DML, DCL and TCL commands on a database. 3 Apply No-SQL concepts for given database. 4 Implement PL/SQL programs for creating stored procedures, cursors & triggers. 5 Design and implement an application using forms and reports.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1		1	1								1	2	
CO2	3	2	2	2	3								1	2	
CO3	3	2	2	3	2	1							2	3	
CO4	3	2	2	1	3	1							2	3	
CO5	3	3	2	3	3	1							2	3	

Programming Exercise:**I. SQL**

1. Creation of database tables without constraints.
2. Creating tables using combination of constraints.
3. Usage of Stored Functions.
4. Exercising all types of Joins.
5. Exercising complex Queries.
6. Experiments on No-SQL.

II. PL/SQL

1. Demonstration of Blocks, Cursors, functions and Packages.
2. Demonstrate Exception Handling.
3. Usage of Triggers to perform operation on Single and Multiple Tables.
4. PL/SQL Procedures for data validation.

Learning Resources:

1. Ivan Bayross, SQL, PL/SQL, The Programming Language of Oracle, 4th Edition, PBP Publications.
2. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications, 1st Edition, 2019.
3. Rick F Van der Lans, Introduction to SQL, 4th Edition (2007), Pearson Education.
4. Benjamin Rosenzweig Elena Silvestrova, Oracle PL/SQL by Example, 3rd Edition (2004), Person Education.
5. Albert Lulushi, Oracle Forms Developer's Handbook, 1st Edition (2006), Pearson Education.
6. <https://www.lynda.com/Access-tutorials/Welcome/195854/373426-4.html>

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

OPERATING SYSTEMS LAB
SYLLABUS FOR B.E. IV-SEMESTER

L:T:P (Hrs./week):0:0:2	SEE Marks:50	Course Code: UII25PC431CS
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES		COURSE OUTCOMES <i>On completion of the course, students will be able to</i>	
1	Apply system calls for process management and file management	1	Implement operations on Files and Process by using system calls
2	Implement techniques related to CPU Scheduling, Main memory management, Process synchronization and deadlock avoidance & detection	2	Implement CPU Scheduling algorithms
		3	Implement Page Replacement techniques
		4	Design and implement solutions for Inter-Process Communication
		5	Implement Kernel module programs

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1			1									3	
CO2	3	2	1		2		1						1	2	1
CO3	2	2	1		1		1					1		2	1
CO4	1	1			2		1					1		3	
CO5	3	2	1		1									2	

Programming Exercise:

1. Building & Booting of Operating system, Disk partitioning and Dual boot of OS
2. Write shell programs to implement a given task.
3. Implement system calls for File system management.
4. Implement system calls for Process management.

5. Write C programs to implement CPU scheduling algorithms (FCSF, SJF, Priority, RR, Multi level)
6. Write C programs to implement Page Replacement algorithms.
7. Implement Inter-process communication using
 - i. Pipes (by using pipe system call)
 - ii. Message Queues (by using msgget, msgsnd, msgrcv system calls)
 - iii. Shared Memory (by using shmget, shmat, shmdt system calls)
8. Implement Process Synchronization for Bounded buffer, Readers-Writers and Dining philosophers' problems using Semaphores. (by using semget, semop system calls)
9. Study pthreads and implement a program which shows the performance improvement in using threads as compared with process.(Examples like Matrix Multiplication, Hyper quicksort, Merge sort, Traveling Sales Person problem)
10. Write a Linux Kernel Module for Task Information extraction.
11. Write a Linux Kernel Module for Listing Tasks.

Learning Resources:

1. Kernighan and Pike, UNIX Programming Environment, PHI/Pearson Education
2. U. Vahalia, UNIX Internals: The New Frontiers, Pearson Education Inc.2003.
3. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, *Operating System Concepts*, 10th Edition (2018), Wiley India.
4. Andrew S. Tanenbaum, *Modern Operating Systems*, 2nd Edition (2001), Pearson Education, Asia.
5. Dhananjay, Dhamdhare.M, *Operating System-concept based approach*, 3rd edition (2009), Tata McGraw Hill, Asia
6. Robet Love: *Linux Kernel Development*, (2004)Pearson Education
7. Richard Stevens, Stephen Rago, *Advanced Programming in the UNIX Environment*, 3rd Edition(2013), Pearson Education
8. <http://web.stanford.edu/~ouster/cgi-bin/cs140-spring19/index.php>
9. <https://nptel.ac.in/courses/106106144/>

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering**DESIGN & ANALYSIS OF ALGORITHMS LAB**

SYLLABUS FOR B.E. IV-SEMESTER

L:T:P (Hrs./week):0:0:2	SEE Marks : 50	Course Code: UII25PC441CS
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1 Implement solutions for the given problems using divide and conquer 2 Implement solutions for the given problems using greedy and dynamic programming 3 Implement solutions for the given problems using backtracking and branch and bound.	1 Implement searching, sorting and hashing using basic data structures. 2 Apply divide and conquer strategy to implement algorithm for a given problem. 3 Implement an algorithm for a given problem using Greedy design strategy 4 Apply dynamic programming to implement algorithms for a set of problems. 5 Implement algorithms for set of problems using backtracking and branch and bound.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	1								1	3	2	1
CO2	2	2	2	1									3	1	
CO3	2	3	3	1									3	1	
CO4	2	2	2	1									2	1	
CO5	3	3	3	2								1	3	1	1

Programming Exercise:

1. Implementation of Merge Sort, Quick Sort, Heap Sort, Binary Search and Hashing.
2. Implementation of Traversal on Graphs.
3. Implementation of Traversal on Trees and DAG.
4. Implement Single source shortest path algorithm.
5. Implement Minimum cost spanning tree algorithm.
6. Implement fractional Knapsack algorithm.
7. Implement Optimal merge patterns -Huffman encoding algorithm.
8. Implement Matrix-chain multiplication algorithm with dynamic programming.
9. Implement LCS algorithm and print Longest common subsequence.
10. Implement All-pairs shortest path algorithm.
11. Implement 0/1 Knapsack algorithm.
12. Implement multi-stage graph.
13. Implementation of N-queens problem with back tracking.
14. Implement Graph coloring problem with back tracking.
15. Implement TSP by branch and bound.
16. Implement 0/1 knapsack by branch and bound.

Learning Resources:

1. Ellis Horowitz, Sartaj Sahani, Sanguthevar Rajasekaran," Fundamentals of computer Algorithms", Second edition (2008),Universities Press.
2. Thomas H. Cormen, Leiserson C.E, Rivest.R.L , Stein.C, Introduction to Algorithm, 2nd edition (2001), MIT press, USA.
3. Michael T. Goodrich, Roberto Tamassia, Algorithm Design, foundations, analysis, and internet examples, WILEY student edition (2006).
4. Aho, Hopcroft, Ulman, The Design and Analysis of Computer Algorithms, (2000), Pearson Education.
5. Algorithm Design, 1st Edition, Jon Kleinberg and ÉvaTardos, Pearson.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LAB**

SYLLABUS FOR B.E. IV-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks:50	Course Code: UII25PC451CS
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1. Understand issues and techniques involved in the creation of intelligent systems	1. Identify and apply machine learning algorithms to solve real world problems. 2. Implement uninformed and informed search to solve the search problems 3. Build Classifier using supervised learning algorithm 4. Predict the value for a given data using regression 5. Build clusters using unsupervised learning algorithm

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	1									3	3	3
CO2	3	2	2	2									3	3	3
CO3	3	2	2	1									3	3	3
CO4	2	1	2	1									3	3	3
CO5	2	1	2	2									3	3	3

Programming Exercise:

1. Basic Data Preprocessing. b. Programs involving pandas, Numpy and Scipy libraries. scikit-learn, Keras and Tensorflow packages
2. Implement an AI program on Uninformed search algorithm Breadth first search, Depth First search, IDFS.
3. Implement an AI program on 8-Puzzle problem using A*
4. Implement an AI program on 8-queens problem. Implement an AI program for Alpha beta pruning. Implement an AI Program for the TIC TAC TOE using minimax method.

5. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a CSV file.
6. Write a program to implement k-Nearest Neighbor algorithm to classify dataset. Print both correct and wrong predictions. Python ML library classes can be used for this problem.
7. Implement the Linear Regression algorithm in order to fit data points
8. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.
9. Write a machine learning program for the perception model and calculate the Error for the back propagation in multilayer network.
10. Write a program for classification using Support Vector Machine
11. Implement k-Means algorithm.
12. Write a program for implementation of genetic algorithm
13. Evaluate various classification algorithms performance on a dataset using various measures like True Positive rate, False positive rate, precision, recall.
14. Implement any ideas using vibe coding

Learning Resources:

1. Tom Mitchell, "Machine Learning", McGraw-Hill Science, First edition.
2. Stuart Russell, Peter Norvig, Artificial Intelligence – A Modern Approach, Third Edition (2015),
3. Daniela Witten, Gareth James, Robert Tibshirani, and Trevor Hastie, An Introduction to Statistical Learning with Applications in R (Springer Texts in Statistics).
4. George F Luger , Artificial Intelligence, Structures and strategies for Complex Problem Solving, Sixth Edition,(2009), Pearson
5. Elaine Rich, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, Third Edition(2009), Tata McGraw Hill
6. <http://www.nptel.ac.in/courses/106105077>
7. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-spring-2005>
8. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-fall-2010/lecture-videos>

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

**SCHEME OF INSTRUCTION AND EXAMINATION(R-25)
FOR B.E BRIDGE COURSE IV SEMESTER (A.Y 2026-27)**

B.E IV Semester								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P		SEE	CIE	
THEORY								
UB25HS410EH	English Language & Communication	2	-	-	3	50	-	-
PRACTICAL								
UB25HS411EH	English Language & Communication Skills Lab	-	-	2	3	50	-	-
TOTAL		2	-	2	-	100	-	-
GRAND TOTAL		4				100		-

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES**ENGLISH LANGUAGE AND COMMUNICATION**

SYLLABUS FOR B.E. IV SEMESTER (Bridge Course)

L :T:P(Hrs/week): 2	SEE Marks :50	Course Code: UB25HS410EH
Credits :0	CIE Marks :-	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The Course will enable the Learners to:	At the end of the course the students will be able to :
1. Understand the fundamental concepts, types, and significance of communication and listening in personal, academic, and professional contexts. 2. Develop effective interpersonal communication and writing skills through teamwork, leadership, paragraph writing, and the correct use of grammar. 3 3. Apply appropriate communication styles, workplace correspondence conventions, and vocabulary-building strategies for professional interactions. 4. Analyze communication barriers and reading texts critically to enhance comprehension and communication effectiveness.	1. Explain the role, importance, and types of communication, and demonstrate effective listening skills in diverse communication situations. 2. Apply principles of team building, leadership, paragraph writing, and grammatical accuracy (subject-verb agreement, tense, and aspect) in oral and written communication. 3. Demonstrate effective workplace communication by using appropriate communication styles, drafting professional letters and emails, and employing an enriched vocabulary. 4. Analyze reading passages and communication barriers, and employ suitable strategies and vocabulary resources to improve comprehension and communication effectiveness.

CO-PO mapping												
CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1									1	3		3
CO2									1	3		3
CO3									1	3		3
CO4									1	3		3

UNIT– 1:0 Foundations of Communication

- 1.1 Role, Importance, Types of Communication: Intrapersonal, Interpersonal and Extra personal Communication.
- 1.2 Importance and Types of Listening.
- 1.3 Grammar Focus: Subject–Verb Agreement.

UNIT– 2:0 Interpersonal Communication

- 2.1 Team Building: Stages of Team Development by Bruce Tuckman; Qualities of an Effective Team Player and Leader.
- 2.2 Fundamentals of Writing: Principles of Paragraph Writing – Coherence, Cohesion and Unity; Use of Appropriate Linkers and Connectives.
- 2.3 Grammar Focus: Tense and aspect

UNIT- 3 Communication at the Workplace

- 3.1 Styles of Communication and Channels and Flow of Communication in Academic and Workplace Organizations.
- 3.2 Letter writing and email etiquette
- 3.3 Vocabulary Enhancement: Synonyms and Antonyms

UNIT- 4 Reading and Vocabulary Building

- 4.1 Reading Comprehension: "Yesterday Was Beautiful" by Roald Dahl.
- 4.2 Barriers to Communication and Strategies to Overcome Them.
- 4.3 Vocabulary Enhancement: One-word Substitutes.

Learning resources Texts:-

- Technical communication - Principles and Practice (2nd Edition 2014) - Meenakshi Raman and Sangeeta Sharma- Oxford University Press.
- Stages of Team Development by Bruce Tuckman-Excerpt.
- Strengthen your Writing- New Edition- V.R. Narayanswami.
- The Oxford Dictionary of Difficult Words.
- A Practical English Grammar- A.J.Thompson and A.V. Martinet

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES**ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB**

SYLLABUS FOR B.E. IV SEMESTER (Bridge Course)

(Common to all branches)

L :T:P(Hrs/week): 2	SEE Marks :50	Course Code: UB25HS411EH
Credits :-	CIE Marks :-	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The Course will enable the learners to: 1. Converse in various situations. 2. Make paper and PowerPoint presentations. 3. Speak effectively using discourse markers.	At the end of the course the learners will be able to : 1. Participate effectively in group discussions, public speaking. Listen for gist and make inferences from various speeches. 2. Research and sift information to make presentations. 3. Use discourse markers and make transitions effectively while speaking.

CO-PO mapping												
CO/ PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1									2	3		3
CO2									2	3		3
CO3									2	3		3

1.0 INTERACTIVE COMMUNICATION SKILLS LAB-TOPICS**1.1 Public speaking:**

Dos and don'ts of public speaking. Listening and analysing speeches of great personalities in history.

1.2 Presentation Skills:

Dos and Don'ts of Power point presentations in groups (branch specific topics)

1.3 **Group discussion:**

Objectives of GD, Types of GDs; Initiating, Continuing, and concluding a GD.

TEXTS FOR REFERENCE

- Life skills by SR Doshi - Public Speaking and other topics.
- Presentation skills in English by Bob Dignen.
- Priyadarshini Patnaik: Group discussion and Interviews, Cambridge University Press India private limited 2011

Prescribed text book for laboratory:

Speak Well: Jayshree Mohanraj, Kandula Nirupa Rani and Indira Babbellapati- Orient Black Swan.

The break-up of marks for CIE &SEE:

SEE	:	50 Marks
Duration	:	180 Minutes