

COURSE OBJECTIVES:

- ✓ To understand the basics of Java programming language.
- ✓ To know the principles of string handling and Inheritance.
- ✓ To understand the usage of packages, interfaces and exception handling.
- ✓ To develop java applications using threads.
- ✓ To define I/O operations and use generic classes.
- ✓ To apply Java concepts in real world Applications.

UNIT I INTRODUCTION TO JAVA**8**

Applications: To check a number is prime, utilizing loops and conditional logic- Simple calculator application to practice basic data types, operators, and control flow statements.

Java Designing Goal-Role of Java Programmer in industry-Features of Java Language, JVM-Setting up the Java development environment-Java Development Kit (JDK), Java Runtime Environment (JRE) and Integrated Development Environment (IDE) setups-Understanding Java's structure-classes, methods and the main function-Variables and Data Types-Scanner class-control statements.

UNIT II CLASSES, STRINGS AND INHERITANCE**8**

Applications: E-commerce platform for designing a shopping cart, Academic GPA calculation, Building a banking application overloading& overriding concept.

Constructors-Methods-Overloading Methods-Java Doc comments-Static members-Static, Nested and Inner Classes. Strings-Basics, String class, methods and String Buffer Class. Inheritance-Basics, Types of Inheritance, Super keyword-Method Overriding-Dynamic Method Dispatch-Abstract Classes-final with Inheritance.

UNIT III PACKAGES, INTERFACES AND EXCEPTION HANDLING**8**

Application : File handling -read/write data from file-check the existence of the file.

Packages and Interfaces-Packages-Packages and Member Access-Importing Packages-Interfaces. Exception Handling basics -Multiple catch Clauses -Nested try Statements- Java's Built-in Exceptions-User defined Exception.

UNIT IV MULTITHREADING**8**

Application: A simple web crawler that fetches data from multiple websites concurrently using threads.

Multithreaded Programming: Java Thread Model-The Main Thread-Creating a Thread and MultipleThreads-Priorities-Synchronization-InterThreadCommunication-Suspending-Resuming and Stopping Threads.

UNIT V I/O HANDLING AND GENERIC PROGRAMMING

8

Application: A program to read data from a text file and store it in a collection.

I/O Basics -Reading and Writing Console I/O- Reading and Writing Files. Generics- Generic Programming-Generic classes-Generic Methods-Bounded Types-Restrictions and Limitations. Enumerations- Wrappers -Auto boxing.

UNIT VI ROLE OF JAVA IN REAL WORLD APPLICATIONS

5

Mobile Applications-spotify,uber,Netflix-Web based Applications- Amazon, LinkedIn, Alibaba-Scientific Applications- NASA, MathWorks (MATLAB), Oracle Labs- Big Data Technologies-Facebook, Airbnb, Spotify- Business Applications- Salesforce, IBM, TCS- Distributed Applications- Cisco, Amazon AWS, Google Cloud- IoT Applications- Bosch, Siemens, Philips-Education Applications- Coursera, Blackboard, Khan Academy

COURSE OUTCOMES:

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

CO1: apply the concepts of classes and objects to solve simple problems.

CO2: develop programs using Strings and Inheritance.

CO3: implement Packages and Interface and use exception handling mechanisms.

CO4: make use of multithreaded model to solve real world problems.

CO5: build Java applications with I/O packages and generic programming concepts.

CO6: Understand the usage of java concepts in real time applications.

45 PERIODS

PRACTICAL EXERCISES

30 PERIODS

LIST OF EXPERIMENTS:

1. Imagine you are working at a large bookstore that has a massive inventory of books. The books are organized by their ISBN (International Standard Book Number) in a shelf system. You need to quickly locate a specific book based on its ISBN, and you also need to ensure the books are neatly arranged on the shelves. Hint(bubble sort, linear search and binary search).
2. Develop stack and queue data structures using classes and objects.
3. Write a program to perform string operations.
4. Write a Java program to create a Student class with following fields i) Hall ticket number ii) Student Name iii) Department Create 'n' number of Student objects where 'n' value is passed as input to constructor.
5. Write a java program to create an abstract class named Shape that contains an empty method named number of Sides (). Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method number of Sides () that shows the number of sides in the given geometrical figures.
6. Solve the above problem using an interface.

7. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception.
8. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
9. Write a program to perform file operations.
10. Develop applications to demonstrate the features of generics classes.
11. Develop a mini project for any application using Java concepts.

TOTAL:75 PERIODS

TEXTBOOKS

1. Herbert Schildt, “Java: The Complete Reference”, 12th Edition, Mc Graw Hill Education, New Delhi, 2022
2. E. Balagurusamy, “Programming with Java”, 7th Edition, Mc Graw Hill Education, New Delhi, 2023

REFERENCES

1. Cay S.Horstmann, “Core Java Fundamentals”, Volume1, 13th Edition, Oracle Press, 2024.
2. Joyce Farrell, “Java Programming”, Cengage Learning, 9th Edition, 2018.
3. John Dean, Raymond Dean, “Introduction to Programming with JAVA - A Problem Solving Approach”, 3rd Edition,Tata Mc Graw Hill, 2021.

	FOUNDATIONS OF DATA SCIENCE	L T P C 3 0 0 3
COURSE OBJECTIVES:		
✓	To understand the data science fundamentals and process.	
✓	To learn to describe the data for the data science process.	
✓	To learn to describe the relationship between data.	
✓	To learn to predictive analysis and model.	
✓	To utilize the Python libraries for Data Wrangling.	
✓	To present and interpret data using visualization libraries in Python.	
UNIT - 1	INTRODUCTION	8
Applications: <i>Real world applications of Data Science - Healthcare, Finance, E-commerce, Manufacturing, Marketing.</i> Data Science: Benefits and Uses - Facets of data - Data Science Process: Overview - Defining research goals - Retrieving data - Data preparation - Exploratory Data Analysis - Build the model - Presenting findings and building applications - Data Warehousing- Data Mining - Basic Statistical descriptions of Data.		
UNIT - 2	DESCRIBING DATA	8
Applications: <i>Sentiment analysis, Business forecasting, Business reports to visualize sales distribution, Analyzing income distribution, student performance, and website traffic.</i> Types of Data - Types of Variables -Describing Data with Tables and Graphs - Describing Data with Averages - Describing Variability - Normal Distributions and Standard (z) Scores: The Normal Curve - z scores - Solving Normal Curve Problems - z scores for Normal Distribution.		
UNIT - 3	DESCRIBING RELATIONSHIPS	8
Applications: <i>Healthcare, Finance, Marketing, Education, Agriculture</i> Correlation - Scatter plots - Positive - Negative - No relationship - Perfect relationship - Curvilinear relationship - Correlation coefficient for quantitative data: r - Computational formula for correlation coefficient - Outlier- Other types of Correlation coefficients.		
UNIT - 4	PREDICTIVE ANALYTICS	8
Applications: <i>Finance, Healthcare, Retail, Weather Forecasting, Insurance, Medical Research, Customer Analytic, Quality Control, Public Health</i> Regression -Regression line: placement of line - Predictive Errors - Least squares regression line		

and Limitation - Standard error of estimate and Key property - importance of r - Assumptions: Linearity - Homoscedasticity - Interpretation of r ² : Repetitive Prediction of the mean - Predictive Errors - Error variability (Sum of Squares) - Multiple Regression Equations - Regression Toward the Mean: The Regression Fallacy - Avoiding the Regression Fallacy.		
UNIT - 5	PYTHON LIBRARIES FOR DATA WRANGLING	8
Applications: <i>Healthcare, Finance, Marketing, Retail, Agriculture, HR Analytics</i> Basics of Numpy arrays -aggregations - Computations on arrays - Comparisons, masks, Boolean logic - Fancy indexing - Structured arrays - Data manipulation with Pandas - Data indexing and selection - Operating on data - Missing data - Hierarchical indexing - Combining datasets - Aggregation and Grouping - Pivot tables.		
UNIT - 6	DATA VISUALIZATION AND TOOLS	5
Applications: <i>Geography, Agriculture, Healthcare, Social Media</i> Importing Matplotlib - Line plots: setting line colours and styles - setting the axes limits of plots - Labelling plots - Scatter plots - Visualizing errors: continuous errors - Density and contour plots - Histograms: Two Dimensional Histograms and Binnings - Kernel Density Estimation(KDE) - Legends - Colours - Subplots - Text and Annotation – Customization – Data visualization Tools - <i>Matplotlib, Seaborn, Plotly, and PyGWalker.</i>		
TOTAL: 45 PERIODS		
OUTCOMES:		
At the end of the course, the students would be able to		
1.	Develop a foundational understanding of the data science process and preparing data for analysis.	
2.	Analyze and describe datasets using various statistical and graphical methods	
3.	Evaluate relationships within data using correlation techniques	
4.	Apply predictive analytics concepts, including regression analysis, predictive errors, and multiple regression equations	
5.	Utilize Python libraries such as NumPy and Pandas for efficient data wrangling	
6.	Design and create impactful visual representations of data using Matplotlib, Seaborn Plotly and PyGWalker	
TEXT BOOKS:		
1.	David Cielen, Arno D. B. Meysman, and Mohamed Ali, “Introducing Data Science”, Manning Publications, 2016. (Unit I)	
2.	Robert S. Witte and John S. Witte, “Statistics”, Eleventh Edition, Wiley Publications, 2017. (Units II and III)	

3.	Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 2016. (Units IV,V and VI)
REFERENCES:	
1.	Allen B. Downey, “Think Stats: Exploratory Data Analysis in Python”, Green Tea Press,2014.
2.	Sanjeev J. Wagh, Manisha S. Bhende, Anuradha D. Thakare, “Fundamentals of Data Science”, CRC Press, 2022.
3.	Chirag Shah, “A Hands-On Introduction to Data Science”, Cambridge University Press, 2020.

COMPUTER ARCHITECTURE

L T P C
3 0 0 3

COURSE OBJECTIVES:

- ✓ To acquaint students with the basic concepts of fundamental components and performance metrics of a computer.
- ✓ To impart the knowledge of data representation in binary and understand implementation of arithmetic algorithms in a typical computer.
- ✓ To describe machine capabilities, design an effective data path design for instruction execution and basics machine level programming.
- ✓ To make students understand the importance of memory systems.
- ✓ To understand the IO interfacing techniques and external storage and their performance metrics for a typical computer.
- ✓ To make students know about future trends in computer Architecture.

UNIT - 1 INTRODUCTION TO COMPUTER SYSTEMS

8

Applications: Personal computers, general-purpose CPUs, Microcontrollers (Arduino), DSPs, embedded systems

Introduction to computer systems - Overview of Organization and Architecture-Functional components of a computer-Registers and register files-Interconnection of components-organization of the von Neumann machine and Harvard architecture-Performance of processor

UNIT - 2 DATA REPRESENTATION AND COMPUTER ARITHMETIC

8

Applications: Early Microprocessors: Intel 4004 and Intel 8080, DSP (Digital Signal Processing) Systems.

Fixed point representation of numbers-algorithms for arithmetic operations: multiplication(Booths, Modified Booths) - division (restoring and non-restoring)- Floating point representation with IEEE standards and algorithms for common arithmetic operations-Representation of non-numeric data (character codes).

UNIT - 3 FUNDAMENTALS OF COMPUTER ARCHITECTURE

8

Applications: Intel x86 and x64 ISAs, Apple's ARM-based Macs

Introduction to ISA (Instruction Set Architecture)-Instruction formats- Instruction types and addressing modes- Instruction execution (Phases of instruction cycle)- Assembly language programming-Subroutine call and return mechanisms-Single cycle Data path design-Introduction to multi cycle data path-Multi cycle Instruction execution.

UNIT - 4 MEMORY SYSTEM ORGANIZATION AND ARCHITECTURE 8

Application: iOS Devices (iPhone, iPad)

Memory systems hierarchy-Main memory organization-Types of Main memory-memory interleaving and its characteristics and performance- Cache memories: address mapping-line size replacement and policies- coherence- Virtual memory systems-TLB-Reliability of memory systems- error detecting and error correcting systems.

UNIT - 5 INTERFACING , COMMUNICATION& PERFORMANCE 8
ENHANCEMENT

Applications: Data centres, Mission critical applications, disaster recovery.

I/O fundamentals: handshaking, buffering-I/O techniques: programmed I/O, interrupt-driven I/O,DMA- Interrupt structures: vectored and prioritized-interrupt overhead- Buses: Synchronous and asynchronous- Arbitration. External storage systems-organization and structure of disk drives: Electronic- magnetic and optical technologies-RAID Levels- I/O Performance- Performance Enhancements- Classification of models - Flynn's taxonomy of parallel machine models (SISD, SIMD, MISD,MIMD)

UNIT - 6 CURRENT AND FUTURE TRENDS 5

Application : Enterprise Storage Systems, Data Centers, Synology NAS

Introduction to Pipelining- Pipelined data path-Introduction to hazards. Future of Computer Architecture-Quantum computing, Neuromorphic Architecture, In-Memory Computing, Specialized hardware, Photonic computing and Multi core processors and GPUs.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- CO1 Analyze the performance of machines with different capabilities.
- CO2 Illustrate binary format for numerical and characters and validate efficient algorithm for arithmetic operations.
- CO3 Analyze and calculate memory traffic for a program execution.
- CO4 Explain the importance of hierarchical memory organization. Able to construct larger memories.
- CO5 Understand the need for an interface. Compare and contrast memory mapping and IO mapping techniques.
- CO6 Understand the future trends in Computer Architecture.

TEXT BOOKS:

1. David A. Patterson and John L. Hennessy, "Computer Organization and Design-The Hardware/Software Interface", 6th edition, Morgan Kaufmann, 2021.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer organization and embedded systems ", McGraw Hill, 6th edition, Reprint, 2023.

REFERENCES:

1. W. Stallings, "Computer organization and architecture", Pearson, 11th edition, 2022.
2. Morris Mano, "Digital Logic and Computer Design", Pearson Education, 2017.

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(Sub Code)

DISCRETE MATHEMATICS
(III SEM FOR CSE,AIDS,CSBS,AI ML, IT,
CYBER SECURITY)

L T P C
3 1 0 4

COURSE OBJECTIVES:

To make the student conversant with the

- ✓ Knowledge of the concepts needed to test the logic of a program.
- ✓ Concept of combinations and permutations.
- ✓ Concept of recurrence relations and counting principles.
- ✓ Terminology of graph and special types of graphs.
- ✓ Concepts and properties of algebraic structures such as groups, rings and fields.
- ✓ Real-world case studies on discrete mathematics.

UNIT - 1 LOGIC AND PROOFS

10

***Applications:** Linguistics, evidence evaluation, philosophical reasoning, automated theorem proving, epistemology.*

Propositional logic - Propositional equivalences - Predicates and quantifiers - Nested quantifiers - Rules of inference - Introduction to proofs - Proof methods and strategy.

UNIT - 2 COMBINATORICS

10

***Applications:** Fractal generation, genetic algorithms, investment growth models, signal processing, solving difference equations.*

Mathematical induction - Strong induction and well ordering - The basics of counting – The (C6) pigeonhole principle - Permutations and combinations. Recurrence relations - Solving linear recurrence relations - Generating functions - Inclusion and exclusion principle

UNIT - 3 GRAPHS

10

***Applications:** Project management (PERT/CPM), signal flow graphs, protein interaction networks.*

Graphs - Graph terminology and special types of graphs - Matrix representation of graphs and (C7) graph isomorphism - Connectivity - Euler and Hamilton graphs.

UNIT - 4 ALGEBRAIC STRUCTURES

10

***Applications:** Musical composition, communication networks, graph theory, rotations.*

Algebraic systems - Semi groups and monoids- Groups - Subgroups - Homomorphism's Normal (C8) subgroup and cosets - Lagrange's theorem - Definitions and examples of Rings and Fields.

UNIT - 5 LATTICES AND BOOLEAN ALGEBRA

10

Applications: *Musical composition, communication networks, graph theory, rotations.*

Partial ordering - Posets - Lattices as posets - Properties of lattices - Lattices as algebraic systems - Sub lattices - Direct product and homomorphism - Some special lattices - Boolean algebra - Sub Boolean Algebra - Boolean Homomorphism.

**UNIT - 6 APPLICATIONS OF DISCRETE MATHEMATICS IN (C1)
REAL LIFE SCENARIO**

10

Apply the recurrence relations in solving CAGR (Compound annual growth rate)- Analyze the shortest path algorithm on tracking material costs impact in final product - Estimate the discount strategies using combinatorics - Analyze the group theory for efficient warehouse logistics and package delivery routes [Amazon, DHL & FedEx] - Apply Boolean logic in SQL queries for effective big data analysis and database management in ISI [Indian Statistical Institute].

TOTAL: 60 PERIODS**OUTCOMES:**

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

1. Utilize mathematical logic concepts, such as inference theory and quantifiers, to effectively solve problems.
2. Solve problems involving recurrence relations, including linear recurrence relations, and utilize generating functions.
3. Represent real-life situations using graph theory, apply principles such as Eulerian and Hamiltonian paths, and interpret various graph representations.
4. Examine the core mathematical principles behind algebraic structures such as groups, rings, and fields.
5. Utilize the concepts of lattices and Boolean algebra to solve logical problems effectively.
6. Apply the basic ideas of algebraic structure, discrete mathematics, Boolean to simulate real-life events.

TEXT BOOKS:

1. Rosen. K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.
2. Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
3. Strang. G., "Linear Algebra and its applications", Thomson (Brooks/Cole), New Delhi, 2005.

REFERENCES:

1. Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2013.
2. Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.
3. Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

CO -PO MAPPING

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

DATA STRUCTURES

L T P C

3 0 2 4

COURSE OBJECTIVES:

- ✓ To introduce basic concepts of data types .
- ✓ To perform operations on linear data structures.
- ✓ To perform operation on non-linear data structures.
- ✓ To utilize relevant graph algorithms for various graph-based applications.
- ✓ To estimate different searching, sorting algorithms.
- ✓ To estimate different hashing techniques.

UNIT I INTRODUCTION TO DATA STRUCTURE AND LIST 8

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

Introduction to Data Structure - Abstract Data Types (ADTs) - List ADT - Array-based implementation - Linked list implementation - Singly linked lists - Circularly linked lists - Doubly-linked lists - Applications of lists - Polynomial ADT - Polynomial Manipulation .

UNIT II LINEAR DATA STRUCTURES–STACKS,QUEUES 8

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

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

UNIT III NON LINEAR DATA STRUCTURES–TREES 8

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

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

UNIT IV NONLINEAR DATA STRUCTURES -GRAPHS 8

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

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

UNIT V SEARCHING AND SORTING

8

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

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

UNIT- VI CURRENT TRENDS IN DATA STRUCTURE

5

Applications - AI & ML - Decision Trees for Predictions, Graphs in Neural Networks - Block chain Technology - Merkle trees, Healthcare and Bioinformatics - IoT - Circular buffer.

45 PERIODS

PRACTICAL EXERCISES

30 PERIODS

LIST OF EXPERIMENTS:

1. Array implementation of List, Stack and Queue ADTs.
2. Implementation of Singly Linked List.
3. Write a program to simulate the working of stack using an array with the following: i) Push ii) Pop iii) Display
The program should print appropriate messages for stack overflow, stack underflow.
4. Linked list implementation of Linear Queue ADTs .
5. Implementation of Polynomial addition and multiplication using Linked list.
6. Implementation of Binary Search Trees.
7. Implementation of Dijkstra's Algorithm.
8. Implementation of Prim's Algorithm.
9. Implementation of Linear Search and Binary Search.
10. Implementation of Insertion Sort and Selection Sort.

TOTAL:75 PERIODS

TEXTBOOKS

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education, 2018.
2. Kamthane, Introduction to Data Structures in C, 1st Edition, Pearson Education, 2007.
3. SartajSahni, "Data Structures, Algorithms and Applications in C++", Silicon paper publications,2004.

REFERENCES

1. SCHAM'S outlines DATA STRUCTURES WITH C SEYMOUR LIPSCHUTZ, Adopted in India by Arrangement with The Tata McGraw-Hill companies, Lnc., New York.
2. Langsam, Augenstein and Tanenbaum, Data Structures Using C and C++, 2nd Edition, Pearson Education,2015.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, Introduction to Algorithms", Fourth Edition, Mcgraw Hill/ MIT Press,2022.
4. Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft ,Data Structures and Algorithms, 1st edition, Pearson, 2002.

DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION

L T P C
3 0 2 4

COURSE OBJECTIVES:

- ✓ To Comprehend the different types of number system.
- ✓ To Evaluate and simplify logic functions using Boolean Algebra and K-map.
- ✓ To Design minimal combinational logic circuits
- ✓ To the current state of art in memory system design
- ✓ To Analyze and Design the Basic Sequential Logic Circuits
- ✓ To explore various alternate techniques for improving the performance of a IC's

UNIT - 1 INTRODUCTION 7

Applications: science, engineering, finance, and computer science.

Number System - Base Conversion - Binary Codes - Complements(Binary and Decimal)

UNIT - 2 BOOLEAN ALGEBRA 8

Applications: Computers, communication systems, and control systems.

Boolean algebra - Properties of Boolean algebra - Boolean functions - Canonical and Standard forms - Logic gates - Universal gates – Karnaugh map

UNIT - 3 COMBINATIONAL CIRCUIT 8

Applications: Combinational circuits are used in many technological devices, including decoders, digital signal processing, and timing assessment.

Adder - Subtractor - Code Converter - Analyzing a Combinational Circuit - Binary Parallel Adder- Look ahead carry - Magnitude Comparator - Decoders – Encoders - Multiplexers – De-multiplexers.

UNIT - 4 CENTRAL PROCESSING UNIT ORGANIZATION 8

Applications: Data cleaning, data integration, filtering, data transformation, financial analysis, reporting, machine learning

General Register Organization - Stack organization - Instruction formats, Addressing modes, Data Transfer and Manipulation, Program Control, CISC and RISC processors

UNIT - 5 SEQUENTIAL CIRCUITS 7

Applications: Traffic light controllers, vending machines, barcode scanners, simple user interfaces, and basic control systems within devices like washing machines or microwave ovens

Flip Flops - Sequential Circuit: Design and Analysis - Finite State Machine: Moore and Mealy model - Sequence Detector - Registers - Shift Registers - Counters - Ripple and Synchronous Counters

UNIT - 6 RECENT TRENDS IN DIGITAL LOGIC

7

Applications: Xilinx also offers software design tools, intellectual property (IP) cores, and design services.

Introduction in digital logic – Digital Electronic Trainer kit manufacturing ,Programmable logic IC manufacture Companies Xilinx, Intel, Lattice

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Comprehend the different types of number system.
2. Evaluate and simplify logic functions using Boolean Algebra and K-map
3. Design minimal combinational logic circuits
4. An ability to identify, formulate, and solve hardware and software computer engineering problems using sound computer engineering principle
5. Analyze and Design the Basic Sequential Logic Circuits
6. Acquire design thinking capability, ability to design a component with realistic constraints, to solve real world engineering problems and analyze the results

TEXT BOOKS:

1. M. Morris Mano, Michael D. Ciletti, “Digital Design : With an Introduction to the Verilog HDL, VHDL, and System Verilog”, Sixth Edition, Pearson Education, 2018.
2. David A. Patterson, John L. Hennessy, “Computer Organization and Design, The Hardware/Software Interface”, Sixth Edition, Morgan Kaufmann/Elsevier, 2020.

REFERENCES:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, “Computer Organization and Embedded Systems”, Sixth Edition, Tata McGraw-Hill, 2012.
2. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Tenth Edition, Pearson Education, 2016.
3. M. Morris Mano, “Digital Logic and Computer Design”, Pearson Education, 2016.

PRACTICAL EXERCISES:

30 PERIODS

1. Verification of Boolean theorems using logic gates.
2. Design and implementation of combinational circuits using gates for arbitrary functions.
3. Implementation of 4-bit binary adder/subtractor circuits.
4. Implementation of code converters.
5. Implementation of BCD adder, encoder and decoder circuits
6. Implementation of functions using Multiplexers.
7. Implementation of the synchronous counters
8. Implementation of a Universal Shift register.
9. Simulator based study of Computer Architecture

(XXXXX)
Subject
Code

LIFE SKILL III – BASIC CONVERSATION SKILLS

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2 0 0 1

COURSE OBJECTIVES:

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

UNIT – I PROFESSIONAL COMMUNICATION

2

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

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

Role-play: Conducting professional conversations

UNIT – II FRAMING QUESTIONS

2

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

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

UNIT – III LISTENING TWO-WAY CONVERSATION

2

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

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

UNIT – IV TWO -WAY CONVERSATION – BASICS

2

“Basic one and one techniques in interview”

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

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

Practice: Asking brainstorming questions

UNIT – VI BASICS OF GROUP DISCUSSION**2**

Dos and Don'ts of group discussion – Evaluation process

Practice: Three group discussions

TOTAL: 12 PERIODS

OUTCOMES:

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

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

REFERENCES:

1. “Advanced Communication Skills” by Mathew Richardson, Charlie Creative Lab, 2020.
2. Andy Gillett, Using English for Academic purposes for students in higher Education.
<https://www.uefap.org/reading/>
3. R. K. Agnihotri and A. L. Khanna. *English for Academic and Professional Purposes*. Macmillan India, 2008
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CO – PO MAPPING

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