B.Sc COURSE STRUCTURE **ANNEXURE-I**

Year	Semester	Course	Title of the paper	No. Hours/ week	Credits
	I		Computer Fundamentals and Office	3	3
			Computer Fundamentals and Office Automation-Practical	2	1
		2	Problem Solving Using C	3	3
			Problem Solving Using C-Practical	2	1
	II	3	Data Structures using C	3	3
			Data Structures using C-Practical	2	1
		4	Digital Logic Design	3	3
			Digital Logic Design -Practical	2	1
II	III	5	Object Oriented Programming using Java -(T)	3	3
			Object Oriented Programming using Java -(P),	2	1
		6	Data structures using C -(T)	3	3
			Data Structures using C -(P)	2	1
		7	Computer Organization-(T)	3	3
			Computer Organization-(P)	2	1
		8	Operating Systems -(T)	3	3
			Operating Systems -(P)	2	1
		9	Database Management System-(T)	3	3
			Database Management System-(P)	2	1
	IV	10	Object Oriented Software Engineering-(T)	3	3
			Object Oriented Software Engineering -(P)	2	1
		11	Data Communications and Computer Networks-(T)	3	3
			Data Communications and Computer Networks--(P)	2	1

COURSE STRUCTURE

B.Com , Computer Application Syllabus

Year	Semester	Course	Title of the paper	No. Hours/ week	Credits
I	I	2	Fundamental s of Information Technology & Office Automation	3	3
			Fundamentals of Information Technology & Office Automation Practical)	2	1
		4	E-Commerce and Web Application and Development	3	3
			E-Commerce and Web Application and Development -Practical	2	1
II	III	7	E-Commerce and web Designing-Theory	3	3
			E-Commerce and web Designing-Practical	2	1
		8	Digital Marketing-Theory	3	2
			Digital Marketing-Practical	2	1
	IV	11	Database Management System with Oracle	3	3
			Database Management System with Oracle Practical	2	1

Syllabus for Introduction to Artificial Intelligence in consonance with Curriculum framework w.e.f. AY 2025-26

Year	Semester	Course	Title of the paper	No. Hours/ week	Credits
1	I	I	AI Fundamentals	4	4
			AI Fundamentals- Practice Session	2	0
			SKILL COURSES		
		III	Information and communication Technology	2	1
		IV	Cyber Security	2	1

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ANNEXURE II

SEMESTER-I

COURSE 1: COMPUTER FUNDAMENTALS AND OFFICE AUTOMATION

Theory Credits: 4 3hrs/week

Course Objectives

1. **Understand foundational computing concepts**, including number systems, the evolution of computers, block diagrams, and generational progress.
2. **Develop knowledge of computer architecture**, focusing on system organization and networking fundamentals.
3. **Acquire practical skills in document creation**, formatting, and digital presentations using word processing tools.
4. **Gain proficiency in spreadsheet operations**, such as data entry, formulas, functions, and charting techniques.
5. **Introduce data visualization and basic modelling principles**, fostering analytical thinking in structuring and interpreting data sets.

Course Outcomes

1. At the End of the Course, The Students will be able to **explain different number systems**, the historical evolution of computers, and identify key components in a block diagram.
2. Learners will demonstrate **basic blocks of a computer and fundamental networking knowledge.**
3. Learners will create professional-level documents and **design visually appealing presentations** using word processing software and presentation software.
4. Learners will manipulate data within spreadsheets, apply formulas, and **generate accurate summaries and visualizations.**
5. Learners will apply data modelling techniques to **analyze, organize, and represent data effectively** in various scenarios.

Unit 1. Number Systems, Evolution, Block Diagram and Generations:

Number Systems: Binary, Decimal, Octal, Hexadecimal; conversions between number systems.
Evolution of Computers: History from early mechanical devices to modern-day systems.

Block Diagram of a Computer: Components like Input Unit, Output Unit, Memory, CPU (ALU+ CU).

Generations of Computers: First to Fifth Generation – technologies, characteristics, examples.

Unit 2. Basic organization and N/W fundamentals:

Computer Organization: Functional components – Input/Output devices, Storage types, Memory hierarchy.

Types of Computers: Micro, Mini, Mainframe, and Supercomputers. **Networking Fundamentals**: Definition, need for networks, types (LAN, WAN, MAN), topology

(Star, Ring, Bus).

Internet Basics: IP Address, Domain Name, Web Browser, Email, WWW.

Unit 3. Word Processing and presentations:

Word Processing Basics: Using MS Word/Google Docs – formatting, styles, tables, mail merge.

Presentation Tools: Using PowerPoint/Google Slides – slide design, animations, transitions.

Applications: Creating resumes, reports, brochures, and presentations. Keyboard Shortcuts

Unit 4. Spreadsheet Basics:

Spreadsheet Concepts: Understanding rows, columns, cells in tools like MS Excel/Google Sheets, cell referencing.

Functions and Formulae: SUM, AVERAGE, IF, COUNT.

Charts and Graphs: Creating visual representations

Data Handling: Sorting, filtering, conditional formatting.

Text Functions: LEFT, RIGHT, MID, LEN, TRIM, CONCAT, TEXTJOIN

Advanced Functions: **Logical**: IF, AND, OR, IFERROR, **Lookup**: VLOOKUP, HLOOKUP, XLOOKUP, INDEX, MATCH

Unit 5. Data Analysis and Visualization:

Conditional Formatting: Custom rules, Color scales, Icon sets, Data bars

Data Analysis Tools: Pivot Tables and Pivot Charts, Data Validation (Drop-downs, Input Messages, Error Alerts), What-If Analysis: Goal Seek, Scenario Manager, Data Tables

Charts and Dashboards: Creating Interactive Dashboards, Using slicers with Pivot Tables,Combo Charts and Sparklines

Productivity Tips: Using Named Ranges, Freeze Panes, Split View

Textbooks:

1. **Fundamentals of Computers,** Reema Thareja, Oxford University Press, Second Edition
2. **Fundamentals of Computers**, V. Rajaraman – PHI Learning
3. **Introduction to Computers** by Peter Norton – McGraw Hill
4. **Microsoft Office 365 In Practice** by Randy Nordell – McGraw Hill Education

References:

1. **Excel 2021 Bible** by Michael Alexander, Richard Kusleika – Wiley
2. **Networking All-in-One For Dummies** by Doug Lowe – Wiley
3. **Microsoft Official Docs and Training**: https://learn.microsoft.com
4. **Google Workspace Learning Center**: https://support.google.com/a/users/

Activities:

Outcome: At the End of the Course, The Students will be able to **explain different number systems**, the historical evolution of computers, and identify key components in a block diagram.

Activity: Create a digital poster or infographic comparing number systems (binary, decimal, octal, hexadecimal) and illustrating the timeline of computer generations with key innovations.

Evaluation Method: Rubric-based assessment of the poster presentation on a 10-point scale focusing on:

- Accuracy of number system conversions
- Correct identification of block diagram components
- Visual organization and creativity

Outcome: Learners will demonstrate **basic blocks of a computer and fundamental networking knowledge.**

Activity: Design a concept map showing the internal architecture of a computer and types of networks (LAN, WAN, MAN), including devices and topologies.

Evaluation Method: Checklist-based peer review and instructor validation:

- Completeness of the map
- Correctness of networking concepts
- Use of appropriate terminology
- Logical flow and structure of the map

Outcome: Learners will create professional-level documents and **design visually appealing presentations** using word processing software and presentation software.

Activity: Prepare a formal report (e.g., project proposal) in a word processor and present it using a slide deck with transitions, embedded media, and design elements.

Evaluation Method: Performance-based evaluation using a 10-point scoring scale:

- Formatting and structure of the document
- Presentation aesthetics and clarity
- Communication skills during presentation

Outcome: Learners will manipulate data within spreadsheets, apply formulas, and **generate accurate summaries and visualizations.**

Activity: Analyze a dataset (e.g., student scores or sales data) using spreadsheet software. Apply formulas (SUM, AVERAGE, IF, VLOOKUP) and create relevant charts.

Evaluation Method: Practical test with a rubric:

- Correct use of formulas
- Accuracy of data summaries

Outcome: Learners will apply data modelling techniques to **analyse, organize, and represent data effectively** in various scenarios.

Activity: Prepare an interactive dashboard for a given data set using EXCEL.

Evaluation Method: Evaluation of the dashboard on a 10-point scoring scale:

- Presentation aesthetics and clarity
- Interactive ness
- Communication skills during presentation

SEMESTER-I

COURSE 1: COMPUTER FUNDAMENTALS AND OFFICE AUTOMATION

Practical	**Credits: 1**	**2 hrs/week**

List of Experiments:

1. Demonstration of Assembling and Dissembling of Computer Systems.
2. Identify and prepare notes on the type of Network topology of your institution.
3. Prepare your resume in Word.
4. Using Word, write a letter to your higher official seeking 10-days leave.
5. Prepare a presentation that contains text, audio and video.
6. Using a spreadsheet, prepare your class Time Table.
7. Using a Spreadsheet, calculate the Gross and Net salary of employees(Min 5) considering all the allowances.
8. Generate the class-wise and subject-wise results for a class of 20 students. Also generate the highest and lowest marks in each subject.
9. Using IF, AND, OR, and IFERROR to Automate Grade Evaluation.
    a. Create a table of student scores in different subjects.
    b. Use IF to assign grades (A/B/C/Fail).
    c. Use IFERROR to handle missing scores or invalid data.
10. *Employee Database Search Using VLOOKUP, HLOOKUP, XLOOKUP, INDEX, and MATCH*
    a. Create a database of employees (Name, ID, Department, Salary).
    b. Implement VLOOKUP to search by employee ID.
    c. Use HLOOKUP to extract department heads by role.
    d. Apply XLOOKUP for more flexible searches.
    e. Use INDEX + MATCH as an alternative to VLOOKUP.
11. Sales Report Analysis Using Pivot Tables and Charts
    a. Use a dataset of product sales (Product, Region, Date, Quantity, Revenue).
    b. Create Pivot Tables to summarize data by region/product.
    c. Insert Pivot Charts for visual analysis (e.g., bar, line).
    d. Add slicers to make the dashboard interactive.
12. Designing a Data Entry Form with Drop-downs and Input Rules
    a. Create a student registration form.
    b. Add drop-down lists for course selection using Data Validation.
    c. Add input messages to guide users.
    d. Add error alerts for wrong entries.
13. Monthly Budget Planning using Goal Seek and Scenario Manager
    a. Create a simple personal budget (income, expenses, savings).
    b. Use Goal Seek to determine income needed to save a desired amount.
    c. Use Scenario Manager to compare different budgeting scenarios (best/ worst/ realistic case).

d. Create a one-variable Data Table to analyze how different expenses affect savings.

14. Dashboard Creation Using Combo Charts, Sparklines & Slicers
    a. Use existing sales or attendance data.
    b. Insert combo charts (e.g., column + line).
    c. Add sparklines to show trends.
    d. Use slicers with Pivot Tables to control dashboard elements.

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SEMESTER-I

COURSE 2: PROBLEM SOLVING USING C

Theory	**Credits: 3**	**3 hrs/week**

Course Objectives:

1. Understand the fundamentals of computer programming, Apply structured problem- solving approaches using algorithms, flowcharts, and C programming constructs.
2. Develop efficient logic using decision-making, loop, and jump control statements.
3. Utilize derived data types like arrays and strings for modular program design.
4. Design and implement modular solutions using functions, recursive logic, pointer operations, and dynamic memory management.
5. Handle complex data structures including structures, unions, and text file operations.

Course Outcomes:

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

1. Understand basic computing concepts, programming paradigms and write structured C programs.
2. Apply control flow statements to solve logical and repetitive tasks in C.
3. Implement arrays and string operations to manage and manipulate data efficiently.
4. Design modular code using functions, recursion, and appropriate parameter passing.
5. Utilize pointers and memory operations for effective data handling. Demonstrate competence in dynamic memory allocation and text file processing.

Unit 1. Introduction to computer programming:

Introduction, Types of software, Compiler and interpreter, Concepts of Machine level, Assembly level and high-level programming, Flowcharts and Algorithms, Fundamentals of C: History of C, Features of C, C Tokens-variables and keywords and identifiers, constants and Data types, Rules for constructing variable names, Operators, Structure of C program, Input /output statements in C-Formatted and Unformatted I/O

Unit 2. Control statements:

Decision making statements: if, if else, else if ladder, switch statements. Loop control statements: while loop, for loop and do-while loop. Jump Control statements: break,continue and goto.

Unit 3. Derived data types in C:

Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays -Declaration, Initialization and Memory representation. Strings: Declaring & Initializing string variables; String handling functions, Character handling functions

Unit 4. Functions:

Function Prototype, definition and calling. Return statement. Nesting of functions. Categories of functions. Recursion (Basic Concept only). Parameter Passing by address & by value. Local and Global variables. Storage classes: automatic, external, static and register.

Pointers: Pointer data type, Pointer declaration, initialization, accessing values using pointers. Pointer arithmetic, Pointers and arrays.

Unit 5. Dynamic Memory Management:

Introduction, Functions-malloc, calloc, realloc, free Structures: Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers. Unions - Union definition; difference between Structures and Unions.

Text Books:

1. Programming in ANSI C, E. Balagurusamy, Tata McGraw Hill, 6 th Edn,
2. Computer fundamentals and programming in C, Reema Theraja, Oxford University Press.
3. C Programming Language, 2nd Edition by Brian W. Kernighan / Dennis Ritchie (Author).

Reference Books:

1. Let us C, Y Kanetkar, BPB publications
2. Head First C: A Brain-Friendly Guide, David Griffiths, Dawn Griffiths

Activities:

Outcome: Understand basic computing concepts, programming paradigms and write structured C programs.

Activity: Create a concept map of computing fundamentals and programming paradigms (procedural, structured, object-oriented). Then, they write a structured C program (e.g., a calculator or student grade system) using proper syntax, indentation, and modular design.

Evaluation Method: Rubric-based Code Review & Viva to check the

- The correctness of the concept map
- Correct use of structure (main + functions)
- Identification of paradigm used
- Code readability and documentation

Outcome: Apply control flow statements to solve logical and repetitive tasks in C.

Activity: Implement a program that solves a logic puzzle (e.g., number guessing game, pattern generation, or prime number finder) using if, switch, for, while, and do-while.

Evaluation Method: Automated Test Cases + Peer Review to check the

- Correct use of control statements
- Logical correctness of output

- Efficiency and edge case handling
- Peer feedback on clarity and logic

Outcome: Implement arrays and string operations to manage and manipulate data efficiently.

Activity: Build a program that stores and arranges student marks in ascending and descending order using arrays and performs string operations like concatenation, comparing, and formatting names.

Evaluation Method: Functional Demonstration + Code Walkthrough to check the

- Correct array and string usage
- Memory efficiency
- Handling of invalid inputs
- Explanation of sorting/searching logic

Activity:

- **Recursive Problem Solver**

Students write a modular program to solve a recursive problem (e.g., factorial, Fibonacci, or Tower of Hanoi) using functions with parameters and return values.

Evaluation Method:

- **Code Trace + Written Quiz**
  - Correct function decomposition
  - Proper parameter passing (by value/reference)
  - Recursion depth and base case handling
  - Quiz on tracing recursive calls

Outcome: Utilize pointers and memory operations for effective data handling. Demonstrate competence in dynamic memory allocation and text file processing.

Activity: Create a program that dynamically stores user input (e.g., survey responses) using pointers and writes/reads the data to/from a text file.

Evaluation Method: Memory Debugging + File I/O Assessment to check the

- Proper use of malloc, calloc, realloc, and free
- Pointer arithmetic and dereferencing
- File creation, reading, writing, and error handling
- Use of tools like Valgrind or manual memory trace (Optional for Unix flavours)

SEMESTER-I

COURSE 2: PROBLEM SOLVING USING C

Practical **Credits: 1** **2 hrs/week**

List of Experiments:

1. Write a program to check whether the given number is Armstrong or not.
2. Write a program to find the sum of individual digits of a positive integer.
3. Write a program to generate the first n terms of the Fibonacci sequence.
4. Write a program to find both the largest and smallest number in a list of integer values
5. Write a program to demonstrate change in parameter values while swapping two integer variables using Call by Value & Call by Address
6. Write a program to perform various string operations.
7. Write a program to search an element in a given list of values.
8. Write a program that uses functions to add two matrices.
9. Write a program to calculate factorial of given integer value using recursive functions
10. Write a program for multiplication of two N X N matrices.
11. Write a program to sort a given list of integers in ascending order.
12. Write a program to calculate the salaries of all employees using Employee (ID, Name, Designation, Basic Pay, DA, HRA, Gross Salary, Deduction, Net Salary) structure.
    a. DA is 30 % of Basic Pay
    b. HRA is 15% of Basic Pay
    c. Deduction is 10% of (Basic Pay + DA)
    d. Gross Salary = Basic Pay + DA+ HRA
    e. Net Salary = Gross Salary - Deduction
13. Write a program to read / write the data from / to a file.
14. Write a program to reverse the contents of a file and store in another file.
15. Write a program to create Book (ISBN,Title, Author, Price, Pages, Publisher)structure and store book details in a file and perform the following operations
    a. Add book details
    b. Search a book details for a given ISBN and display book details, if available
    c. Update a book details using ISBN
    d. Delete book details for a given ISBN and display list of remaining Books

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SEMESTER-II

COURSE 3: DATA STRUCTURES USING C

Theory	Credits: 3	3 hrs/week

Course Objectives:

1. Understand fundamental concepts of algorithms and data structures with focus on complexity analysis and abstract data types.
2. Explore various types of linked lists and their dynamic memory representations and operations.
3. Analyze and implement linear data structures, such as stacks and queues, and examine their real-world applications.
4. Apply sorting and searching algorithms, understanding their performance implications and optimization strategies.
5. Design and manipulate hierarchical and graph-based structures, applying traversal algorithms and understanding their practical uses in computing.

Course Outcomes:

Learners will be able to:

1. Explain algorithm characteristics, time and space complexity, and asymptotic notations with clarity.
2. Implement and analyse different types of linked lists, including insertion, deletion, and traversal operations.
3. Develop stack and queue data structures using arrays and linked lists, and apply them in expression evaluation.
4. Apply efficient searching and sorting algorithms to solve computational problems and evaluate performance trade-offs.
5. Construct and traverse tree and graph structures, using them to solve problems like shortest path and spanning trees.

Unit 1. Basic Concepts:

Algorithm: Definition and characteristics, Complexity analysis: Space Complexity, Time Complexity, Asymptotic Notations.

Introduction to Data structures: Definition, Types of Data structures, Abstract Data Types (ADT), Introduction to Linked Lists, Representation of linked lists in Memory, Comparison between Linked List and Array.

Unit 2. Linked Lists:

Types of Linked Lists - Singly Linked list, Doubly Linked list, Circularly Singly Linked list, Circularly Doubly Linked list; Implementation of Single Linked List ADT: Creating a List, traversing a linked list, searching in linked list, Insertion and deletion into linked list (At first Node, Specified Position, Last node).

Unit 3. Stacks and Queues:

Introduction to stack ADT, Implementation of stacks using array and Linked List, Application of stacks - Polish Notations - Converting Infix to Post Fix Notation - Evaluation of Post Fix Notation.

Queues: Introduction to Queue ADT, Implementation of Queues using array and Linked List, Application of Queues, Circular Queues.

Unit 4. Searching and Sorting:

Linear or Sequential Search, Binary Search.

Sorting: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort and Merge Sort

Unit 5. Trees and Graphs:

Tree Terminology, Binary Tree Representation, Traversal techniques, Expression Tree, Binary Search Tree- Definition, Operations on a Binary Search Tree: Creation, Search, Insertion & deletion.

Graphs: Introduction to Graphs, Terminology, Representation (Adjacency Matrix, Adjacency List), Traversal of Graphs (DFS, BFS), Applications of Graphs, Concept of Minimum Cost Spanning Tree

Textbooks:

1. Data Structures Using C, Balagurusamy E. Tata MCGraw Hill
2. Data Structures using C, Reema Thareja, Third Edition, Oxford University Press

Reference Books:

1. Data Structures, Lipschutz, Schaum's Outline Series, Tata Mcgraw-hill
2. Data Structures Using C, Ch. Vijay Kumar, Pen Press International

Activities:

Outcome: Explain algorithm characteristics, time and space complexity, and asymptotic notations with clarity

Activity: Create a comparative chart of algorithms with different notations related to time and space complexities.

Evaluation Method: Rubric-based assessment of the chart for correctness, clarity, and depth of explanation on a 10-point scale.

Outcome: Implement and analyze different types of linked lists, including insertion, deletion, and traversal operations

Activity: Code a menu-driven program in C to implement single linked lists with all basic operations.

Evaluation Method: Practical lab assessment with test cases and Viva-style questioning to explain pointer manipulation.

Outcome: Develop stack and queue data structures using arrays and linked lists, and apply them in expression evaluation

Activity: Build a program to convert infix expressions to postfix and evaluate them using stacks; Implement queues using both arrays and linked lists with enqueue/dequeue operations.

Evaluation Method: Code review and execution of programs for sample cases and evaluation based on correctness and efficiency.

Outcome: Apply efficient searching and sorting algorithms to solve computational problems and evaluate performance trade-offs

Activity: Implement and compare sorting algorithms (e.g., selection sort and bubble sort) and searching algorithms (e.g., Linear vs. Binary Search) on datasets of varying sizes. Record number of swaps and iterations for preparing a chart to assimilate the results.

Evaluation Method: Performance report with graphs and analysis. Oral presentation or peer review discussing trade-offs and algorithm selection rationale.

Outcome: Construct and traverse tree and graph structures, using them to solve problems like shortest path and spanning trees

Activity: Implement binary trees and graphs using adjacency lists/matrices.

Evaluation Method: Lab demo with sample inputs and visual output (e.g., tree traversal order, graph paths)

SEMESTER-II

COURSE 3: DATA STRUCTURES USING C

Practical	**Credits: 1**	**2 hrs/week**

List of Experiments

1. Write a program to read 'N' numbers of elements into an array and also perform the following operation on an array
   a. Add an element at the beginning of an array

   b. Insert an element at given index of array

   c. Update an element using a values and index

   d. Delete an existing element

2. Write a program to implement Single Linked List with insertion, deletion and traversal operations
3. Write a program to implement Doubly Linked List with insertion, deletion and traversal operations
4. Write a program to implement the Stack operations using Arrays and Linked Lists.
5. Write a program to convert a given infix expression to a postfix expression using stacks.
6. Write a program to implement the Queue operations using Arrays and Linked Lists.
7. Write a program to implement the Circular Queue operations using Arrays.
8. Write a program for Binary Search Tree Traversals
9. Write a program to search an item in a given list using the following Searching Algorithms
   a. Linear Search

   b. Binary Search.

10. Write a program for implementation of the following Sorting Algorithms
    a. Bubble Sort

    b. Insertion Sort

    c. Quick Sort

    d. Merge Sort

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SEMESTER-II

COURSE 4: DIGITAL LOGIC DESIGN

Theory	Credits: 3	3 hrs/week

Course Objectives

1. Introduce the fundamentals of number systems, their conversions, and binary arithmetic operations.
2. Explore digital logic through gates, Boolean algebra, and simplification techniques for logic functions.
3. Develop proficiency in designing basic combinational circuits like adders and subtractors.
4. Equip students with the skills to implement advanced combinational components such as multiplexers, encoders, and decoders.
5. Foster understanding of sequential circuits, flip-flops, counters, and shift registers for system-level design.

Course Outcomes

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

1. Apply concepts of number systems to perform radix conversions and binary arithmetic using signed and unsigned formats.
2. Simplify logic functions using Boolean algebra, Karnaugh maps, and universal gates.
3. Design and analyze combinational circuits such as half adders, full adders, and subtractors.
4. Construct advanced combinational logic modules, including multiplexers, demultiplexers, encoders, decoders, and their hierarchical versions. Realize complex Boolean functions using combinations of logic modules.
5. Develop and evaluate sequential circuits such as flip-flops, latches, counters, and shift registers.

Unit 1: Number Systems:

Conversion of numbers from one radix to another radix, r's, (r-1)'s complements, signed binary numbers, addition and subtraction of unsigned and signed numbers, weighted and unweighted codes.

Unit 2. Logic Gates and Boolean Algebra:

NOT, AND, OR, universal gates, X-OR and X-NOR gates, Boolean laws and theorems, complement and dual of a logic function, canonical and standard forms, two level realization of logic functions using universal gates, minimizations of logic functions (POS and SOP) using Boolean theorems, K-map (up to four variables), don't care condition

Unit 3. Combinational Logic Circuits – 1:

Design of half adder, full adder, half subtractor, full subtractor, ripple adders and subtractors, ripple adder / subtractor.

Unit 4. Combinational Logic Circuits – 2:

Design of decoders, encoders, priority encoder, multiplexers, demultiplexers, higher order decoders, demultiplexers and multiplexers, realization of Boolean functions using decoders, multiplexers.

Unit 5. Sequential Logic Circuits:

Classification of sequential circuits, latch and flip-flop, RS- latch using NAND and NOR Gates, RS, JK, T and D flip-flops, truth tables and excitation tables, conversion of flip- flops, flip-flops with asynchronous inputs (preset and clear). Shift register.

Text Books:

1. Digital Design, M. Morris Mano, Michael D Ciletti,5th edition, Pearson.
2. Digital Logic Design, K.C. Rao, Ramana, Pen International Press

Reference Books:

1. Digital Electronics and Logic Design, Jaydeep Chakravorty, Universities Press
2. Digital Logic Design, Sonali Singh, BPB Publications

Activities:

Outcome: Apply concepts of number systems to perform radix conversions and binary arithmetic using signed and unsigned formats

Activity: Design a calculator in a spreadsheet or simulation tool (e.g., Logisim) that performs: Decimal ↔ Binary ↔ Hexadecimal conversions and binary arithmetic (addition, subtraction).

Evaluation Method: Rubric-based evaluation on a 10point scale (conversion accuracy, arithmetic correctness)

Outcome: Simplify logic functions using Boolean algebra, Karnaugh maps, and universal gates

Activity: Provide students with complex Boolean expressions and truth tables. Ask them to: Simplify using Boolean laws, Minimize using Karnaugh maps and Implement using only NAND or NOR gates

Evaluation Method: Worksheet submission with step-by-step simplification and evaluation of gate-level implementation using a 10-point scale.

Outcome: Design and analyze combinational circuits such as half adders, full adders, and subtractors

Activity: Build and simulate: Half adder and full adder using logic gates, and half and full subtractor circuits

Evaluation Method: Evaluate the correctness of the circuits for different inputs on a 10-point scale.

Outcome: Construct advanced combinational circuits, including multiplexers, demultiplexers, encoders and decoders.

Activity: Design Multiplexers for function selection, Decoders for control signal generation and Encoders for input compression

Evaluation Method: Project-based evaluation with functional demo and assessments based on a

10-point scale.

Outcome: Develop and evaluate sequential circuits such as flip-flops, latches, counters, and shift registers

Activity: Implement and test SR, JK, D, T flip-flops, asynchronous and synchronous counters using a simulator (E.g. Logisim, Multisim)

Evaluation Method: Lab assessment on a 10-point scale to understand the correctness of the circuit and presentation of the design. Introduce the fundamentals of number systems, their conversions, and binary arithmetic operations.

6. Explore digital logic through gates, Boolean algebra, and simplification techniques for logic functions.
7. Develop proficiency in designing basic combinational circuits like adders and subtractors.
8. Equip students with the skills to implement advanced combinational components such as multiplexers, encoders, and decoders.
9. Foster understanding of sequential circuits, flip-flops, counters, and shift registers for system-level design.

Course Objectives

10. Introduce the fundamentals of number systems, their conversions, and binary arithmetic operations.
11. Explore digital logic through gates, Boolean algebra, and simplification techniques for logic functions.
12. Develop proficiency in designing basic combinational circuits like adders and subtractors.
13. Equip students with the skills to implement advanced combinational components such as multiplexers, encoders, and decoders.
14. Foster understanding of sequential circuits, flip-flops, counters, and shift registers for system-level design.

Course Outcomes

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

6. Apply concepts of number systems to perform radix conversions and binary arithmetic using signed and unsigned formats.
7. Simplify logic functions using Boolean algebra, Karnaugh maps, and universal gates.
8. Design and analyze combinational circuits such as half adders, full adders, and subtractors.
9. Construct advanced combinational logic modules, including multiplexers, demultiplexers, encoders, decoders, and their hierarchical versions. Realize complex Boolean functions using combinations of logic modules.
10. Develop and evaluate sequential circuits such as flip-flops, latches, counters, and shift registers.

Unit 1: Number Systems:

Conversion of numbers from one radix to another radix, r's, (r-1)'s complements, signed binary numbers, addition and subtraction of unsigned and signed numbers, weighted and unweighted codes.

Unit 2. Logic Gates and Boolean Algebra:

NOT, AND, OR, universal gates, X-OR and X-NOR gates, Boolean laws and theorems, complement and dual of a logic function, canonical and standard forms, two level realization of logic functions using universal gates, minimizations of logic functions (POS and SOP) using Boolean theorems, K-map (up to four variables), don't care conditions.

Unit 3. Combinational Logic Circuits – 1:

Design of half adder, full adder, half subtractor, full subtractor, ripple adders and subtractors, ripple adder / subtractor.

Unit 4. Combinational Logic Circuits – 2:

Design of decoders, encoders, priority encoder, multiplexers, demultiplexers, higher order decoders, demultiplexers and multiplexers, realization of Boolean functions using decoders, multiplexers.

Unit 5. Sequential Logic Circuits:

Classification of sequential circuits, latch and flip-flop, RS- latch using NAND and NOR Gates, RS, JK, T and D flip-flops, truth tables and excitation tables, conversion of flip- flops, flip-flops with asynchronous inputs (preset and clear). Shift register.

Text Books:

3. Digital Design, M. Morris Mano, Michael D Ciletti,5th edition, Pearson.
4. Digital Logic Design, K.C. Rao, Ramana, Pen International Press

Reference Books:

3. Digital Electronics and Logic Design, Jaydeep Chakravorty, Universities Press
4. Digital Logic Design, Sonali Singh, BPB Publications

Activities:

Outcome: Apply concepts of number systems to perform radix conversions and binary arithmetic using signed and unsigned formats

Activity: Design a calculator in a spreadsheet or simulation tool (e.g., Logisim) that performs: Decimal ↔ Binary ↔ Hexadecimal conversions and binary arithmetic (addition, subtraction).

Evaluation Method: Rubric-based evaluation on a 10point scale (conversion accuracy, arithmetic correctness)

Outcome: Simplify logic functions using Boolean algebra, Karnaugh maps, and universal gates

Activity: Provide students with complex Boolean expressions and truth tables. Ask them to: Simplify using Boolean laws, Minimize using Karnaugh maps and Implement using only NAND or NOR gates

Evaluation Method: Worksheet submission with step-by-step simplification and evaluation of gate-level implementation using a 10-point scale.

Outcome: Design and analyze combinational circuits such as half adders, full adders, and subtractors

Activity: Build and simulate: Half adder and full adder using logic gates, and half and full subtractor circuits

Evaluation Method: Evaluate the correctness of the circuits for different inputs on a 10-point scale.

Outcome: Construct advanced combinational circuits, including multiplexers, demultiplexers, encoders and decoders.

Activity: Design Multiplexers for function selection, Decoders for control signal generation and Encoders for input compression

Evaluation Method: Project-based evaluation with functional demo and assessments based on a 10-point scale.

Outcome: Develop and evaluate sequential circuits such as flip-flops, latches, counters, and shift registers

Activity: Implement and test SR, JK, D, T flip-flops, asynchronous and synchronous counters using a simulator (E.g. Logisim, Multisim)

SEMESTER-II

COURSE 4: DIGITAL LOGIC DESIGN

Practical	**Credits: 1**	**2 hrs/week**

List of Experiments

The laboratory work can be done by using physical gates and necessary equipment or simulators.

Simulators: https://sourceforge.net/projects/gatesim/ or https://circuitverse.org/ or any free open- source simulator

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean functions using logic gates in both SOP and POS forms
3. Realization of basic gates using universal gates.
4. Design and implementation of half and full adder circuits using logic gates.
5. Design and implementation of half and full subtractor circuits using logic gates.
6. Verification of stable tables of RS, JK, T and D flip-flops using NAND gates.
7. Implementation and verification of Decoder and encoder using logic gates.
8. Implementation of 4X1 MUX and DeMUX using logic gates.
9. Implementation of 8X1 MUX using suitable lower order MUX.
10. Implementation of 7-segment decoder circuit.
11. Implementation of 4-bit parallel adder.
12. Design and verification of 4-bit modulus counter.

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SEMESTER-III

COURSE 5: Object Oriented Programming using Java

Theory	Credits: 3	3 hrs/week

Course Objective:

To introduce object-oriented Programming using java (OOP) – fundamental concepts. exceptions, database connections and evaluate efficient and reliable network solutions.

UNIT I

OOPs concepts and Java Programming: Introduction to object-oriented concepts, Procedural and object-oriented programming paradigm

Java programming: An overview of Java, Java Environment, Datatypes, Variables, constants, scope and life time of variables, operators, type conversion and casting, Accepting Input from the Keyboard, Reading Input with Java.util.. Scanner Class, Displaying Output with system.out.printf(), Displaying Formatted output with String. Format (). control statements

UNIT.II

Arrays, Command Line Arguments, Strings-String Class Methods

Classes & Objects: Creating Classes, declaring objects, Methods, parameter passing, static

fields and methods, constructors, and 'this' keyword, overloading methods and access Inheritance: Inheritance hierarchies, super and subclasses, member access rules, super, keyword, preventing inheritance: final classes and methods, the object class and its methods; Polymorphism: Dynamic binding, method overriding, abstract classes and methods

UNIT-III

Interface: Interfaces VS Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface;

Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages. Exception Handling: Benefits of exception handling, the classification of exceptions, Exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception subclasses.

UNIT-IV

Multithreading: Differences between multiple processes and multiple threads, thread states, thread life cycle, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication, stream based on (java.io) The Stream classes -Byte streams and character streams, reading console Input and writing console output, File class, Reading and writing Files, The Console class, Serialization

UNIT-V

Introduction, MVC architecture, components, containers. Understanding Layout Managers -Flow Layout, Border Layout, Grid Layout, Card Layout, Crid Bag layout. Event Handling-The Delegation event model-

Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events Adapter classes, Inner classes, Anonymous Inner classes.

Text Books:

1. Java The complete reference, 8th edition, Herbert Schildt, McGraw Hill.

2. Understanding Object-Oriented Programming with Java, updated edition, T.Budd, Pearson Education.

Reference Books

1. CayS.Horstmann, "Core Java Fundamentals", Volume 1, 11 th Edition, Prentice Hall, 2018. 2. Paul Deitel, Harvey Deitel, "Java SE8 for programmers", 3rd Edition, Pearson, 2015

3. S.Malhotra, S.Chudhary, Programming in Java, 2ndedition, Oxford Uni Press

SEMESTER-III

COURSE 5: Object Oriented Programming using Java

Practical **Credits: 1** **2 hrs/week**

List of Experiments

l. Write a Java programme to print Fibonacci series using for loop.

2. Write a Java program to calculate multiplication of2matrices.

3. Create a class Rectangle. The class has attributes length and width. should have methods that calculate the perimeter and area of the rectangle. It should have read Attributes method to read length and width from user.

4. Write a Java program that implement method overloading.

5. Write a lava program for sorting a given list of names in ascending order.

6. Write a Java program that displays the number of characters, lines and words in a text file.

7. Write a Java program to implement various types of inheritance i. Single ii. Multi-Level iii. Hierarchical iv. Hybrid

8. Write a java program to implement runtime polymorphism.

9. Write a Java program which accepts withdraw amount from the user and throws an exception "ln Sufficient Funds" when with draw amount more than available amount.

10. Write a Java program to create three threads and that displays "good miming", for every one second, "hello" for every 2 seconds and "welcome" for every 3 seconds by using extending Thread class.

ll. Write a Java program that creates three threads. First thread displays "OOPS", the second thread displays "Through" and the third thread Displays "JAVA" by using Runnable interface.

12. Implement a Java program for handling mouse events when the mouse entered, exited, clicked, pressed, released, dragged and moved in the client area.

13. Implement a lava program for handling key events when the key board is pressed, released, typed.

14. Write a Java swing program that reads two numbers from two separate text fields and display sum of two numbers in third text field when button" add" is pressed.

15. Write a Java program to design student registration form using Swing Controls. The form which having the following fields and button SAVE Form Fields are: Name, RNO, Mail id, Gender, Branch, Address

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SEMESTER-III

COURSE 6: DATA STRUCTURES USING C

Theory **Credits: 3** **3 hrs/week**

Course Objectives:

To introduce the fundamental concept of Data structures and to emphasize the importance of

Various Data structures in developing and implementing efficient algorithms.

Course Outcomes:

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

l. Understand various Data Structures for data storage and processing.

2. Realize Linked List Data Structure various operations

3. Analyze step by step and develop algorithms to solve real world problems by implementing Stacks, Queues data structures.

4. Understand and implement various searching & sorting techniques.

5. Understand the Non-Linear Data Structures such as Binary Trees and Graphs

UNIT-I:

Basic Concepts: Pointers and dynamic memory allocation, Algorithm-Definition and characteristics, Algorithm Analysis-Space Complexity, Time Complexity, Asymptotic Notation introduction.

Data structures: Definition, Types of Data structure, Abstract Data Types (ADT), Difference between Abstract Data Types and Data Structures.

Arrays-Concept of Arrays, Single dimensional array, Two dimensional array, Operations on arrays with Algorithms (searching, traversing, inserting, deleting)

UNIT-II

Linked List: Concept of Linked Lists, Representation of linked lists in Memory, Comparison between linked lists and Array.

Types of Linked Lists - Singly Linked list, Doubly Linked list, Circularly Singly Linked list, Circularly Doubly Linked list; Implementation of Linked List ADT: Creating a List, Traversing a linked list, Searching linked list, insertion and deletion into linked list (At first Node, Specified Position, Last node), Application of linked lists.

UNIT-III

Stacks: introduction to stack ADT, Representation of stacks with array and Linked List, implementation of stacks, Application of stacks - Polish Notations - Converting Infix to Post Fix Notation - Evaluation of Post Fix Notation - Tower of Hanoi, Recursion: Concept and Comparison between recursion and the ration

Queues: introduction to Queue ADT, Representation of Queues with array and Linked list, implementation of Queues, Application of Queues Types of Queues- Circular Queues, De-queues, Priority Queue

UNIT-IV

Searching: Linear or Sequential Search, Binary Search and indexed Sequential Search **Sorting:** Selection Sort, Bubble Sort, insertion Sort, Quick Sort and Merge Sort.

UNIT-V

Binary Trees: Concept of Non Linear Data Structures, introduction Binary Trees, Types offers, Basic Definition of Binary Trees, Properties of Binary Trees, Representation off binary Trees, Operations on a Binary Search Tree, Binary Tree Traversal, Applications of Binary Tree.

Graphs: introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs (DFS, BFS), Application of graphs.

Textbooks:

1. HorowitzandSahani,"Fundamental Data Structures", Galgotia PublicationsPvtLtd Delhi India.

2. A.K.Sharma, Data structure using C, Pearson Education India.

3. "Data Structures UsingC"BalagurusamyE.TMH

Reference Books

l. "Data Structures through C", YashavantKanetkar, BPB Publications

2. RajeshK.shukla,"DataStructureUsingCandC++"WileyDreamtechPublication'

3. Lipschutz,"Datastructures"Schaum's OutlineSeries, Tata McgrawhillEducation(lndia)Pvt.Ltd

4. Michael T. Goodrich, Roberto Tamassia, David M' Mount "Data Structures and Algorithms in Q++", Wileylndia'

SEMESTER-III

COURSE 6: DATA STRUCTURES USING C

Practical **Credits: `1** **2 hrs/week**

l. Writeaprogramtoread'N'numbersofelementsintoanarrayandalsoperformthefollowing operation on an array

a. Add an element at the beginning of an array

b. Insert an element at given index of array

c. Update an element using a values and index

d. Delete an existing element

2. Write Program to implement Single Linked List with insertion, deletion and traversal operations

3. Write Program to implement Circular double LinkedList with insertion, deletion and traversal operations

4. Write Programs to implement the Stack operations using an array

5. Write a program using stack to convert a given infix expression to postfix

6. Write Programs to implement the Stack operations using Liked List.

7. Write Programs to implement the Queue operations using an array.

8. Write Programs to implement the Queue operations using Liked List.

9. Write a program for Binary Search TreeTraversals

10. Write a program to search an item in a given list using the following Searching Algorithms

a. Linear Search

b. Binary Search.

I l. Write aprogram for implementation of the following Sorting Algorithms

a. Bubble Sort

b. Insertion Sort

c. Quick Sort

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SEMESTER-III

COURSE 7: Computer Organization

Theory	Credits: 3	3 hrs/week

UNIT- I

Register Transfer Language and Micro Operations: Introduction- Functional units, Computer registers, register transfer language, register transfer, bus and memory transfers, arithmetic, logic and shift micro-operations, arithmetic logic shift unit.

Basic Computer Organization and Design: instruction codes, instruction cycle. Register reference instructions, Memory-reference instructions, input-output and interrupt

UNIT- II

CPU and Micro Programmed Control: Central Processing unit: Introduction, instruction formats, addressing modes. Control memory, address sequencing, design of control unit - hard wired control, micro programmed control.

UNIT- III

Memory Organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache Memory and mappings.

UNIT-IV

Input-Output Organization: Peripheral Devices, input-output interface, asynchronous data transfer, modes of transfer programmed l/O, priority interrupt, direct memory access, input-Output Processor (IOP).

UNIT-V

Computer Arithmetic and Parallel Processing: Data representation fixed point, floating point, addition and subtraction, multiplication and division algorithms. Parallel Processing-parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline

Text Books:

I.M. Moris Mano, "Computer Systems rchitecture" 3rdedition, Pearson/PHI'

Reference Books:

I Carl Hamacher, Zvonks Vranesic, safea Zaky, "ComputerOrganization",5th edition, M cGrawHill.

2. WilliamStallings,"Computer Organization and Architecture",

8thedition, Pearson /phi. suggested co. Curricular activities & evaluation methods:

Unit l:

Activity: Quiz competition on micro-operations. Evaluation Method: Accuracy and speed in answering quiz questions.

Unit2:

Activity: Instruction Format Puzzle: Solving a puzzle to decode and understand instruction formats.

Evaluation Method: Accuracy and speed in completing the puzzle.

Unit 3:

Activity: Memory Hierarchy Poster: Creating in form active posters or in `for graphics on memory hierarchy.

Evaluation Method: Clarity of information, presentation and creativity of obsolescing'

Unit4:

Activity: l/O Troubleshooting Challenge Evaluation Method: problem identification, feasibility of proposed solutions, and clarity of explanations.

Unit5: Activity: Case Study on Parallel processing architecture.

SEMESTER-III

COURSE 7: Computer Organization

Practical **Credits: 3** **3 hrs/week**

1. Implement a C program to convert a Hexadecimal, octal, and binary number to decimal number vice versa.

2. Implement a C program to perform Binary Addition &Subtraction

3. Implement a C program to perform Multiplication of two binary numbers.

4. Implement arithmetic micro-operations using logic gates.

5. Implement logic and shift micro-operations using logic gates.

6. Implement a C program to perform Multiplication of two binary numbers(signed)using Booth's Algorithms.

7. implement a C program to perform division of two binary numbers (Unsigned)us in restore ng division algorithm

. 8. Implement a C program to perform division of two binary numbers (Unsigned)us in gnon restoring division algorithm.

9. Write assembly language code for A+B*(C D) using various instruction formats in

MASM or any open-source assembler

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SEMESTER-III

COURSE 8: Operating System

Theory **Credits: 3** **3 hrs/week**

Learning Objectives:

To gain knowledge about various functions of an operating system like memory management, process management, device management, etc.

Course Outcomes:

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

l. Demonstrate knowledge and comprehension of operating system functions.

2. Analyse different process scheduling algorithms and applications). The to manage processes an threads effectively

3. create strategies to prevent, detect, and recover from deadlocks, and design solutions for inter-process communication and synchronization problems.

4. Compareandcontrastdifrerentmemoryallocationstrategiesandevaluatetheireffectiveness

5. EvaluatediskschedulingalgorithmswhileimplementingOssecuritymeasures

UNIT-I

What is operating System? History and Evolution of os, Basic os functions, Resource Abstraction, Types of Operating Systems- Multiprogramming Systems, Batch Systems, Time Sharing Systems; operating systems for Personal computers, workstations and Hand-held Devices, ProcessControl & Real time Systems.

UNIT.II

Processor and User Modes, Kemels, System Calls and System programs, System View.

The Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading lssues, Thread Libraries; Process Scheduling-Non-primitive and primitive Scheduling Algorithms.

UNIT III

Process Management: Deadlock, Dead lock characterization, Necessary and Sufficient conditions for Deadlock, Deadlock Handling Approaches: Deadlock prevention, Deadlock Avoidance and Deadlock Detection and Recovery. Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter process communication; Process Synchronization, classical process Synchronization problems: Producer-Consumer, Reader-Writer.

UNIT IV

Memory Management: Physical and Virtual Address Space; Memory Allocation Strategies-Fixed and-Variable Partitions, Paging, Segmentation, Virtual Memory'

UNIT V

File and l/o Management, OS security: Directory structure, File operations, File Allocation Methods, Device Management, Pipes, Buffer, shared Memory 'Disk Scheduling algorithms.

Text Books:

l. Operating System Principles by Abraham Silberschatz' Peter Baer Galvin and Greg Gagne(7thEdition) Wiley India Edition.

Reference Books l. Operating Systems: Internals and Design Principles by Stallings(Pearson) 2. Operating Systems by J' Archer Harris(Author),Jyoti Singh(Autho0(TMH)

SUGGESTEDCO-CIRCULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: case Study on a specific operating System: highlighting its functions and key features.

Evaluation Method: case study presentation, depth of understanding of operating system functions, and ability to Particulate key concept

Unit2: Activity: Comparison Poster on Scheduling Algorithms Evaluation Method: Assessment of posters based on content accuracy, clarity of information, visual presentation, and ability to convey key in sights.

Unit3: Activity: Assignment on Dead Lock prevention techniques Evaluation Method: Understanding, Completion and report'

Unit4: Activity: Debate on various Memory allocation schemes Evaluation Method: Debate arguments, ability to counter opposing viewpoints, logical reasoning, and presentation skills.

Unit5: Activity: comparative study of Various disk scheduling algorithms using real world at a sets

Evaluation Method: Analysis methodology, accuracy of results, and presentation off Endings and conclusions.

SEMESTER-III

COURSE 8: Operating System

Practical	**Credits: 1**	**2 hrs/week**

List of Experiments:

L lllustrate the LINUX commands

a) pwd
b) mkdir
c) rmdir
d) grep
e) chmod
f) ls
g) rm
h)cp

2. Write a program to calculate average waiting time and turnaround time of each proces s using the following CPU Scheduling algorithm for the given process schedules.

a) FCFS
b) SJF
c) Priority
d) Round Robin

3. Simulate MVT and MFT memory management techniques
4. Write a program for Bankers Algorithm for Dead Lock Avoidance
5. Implement Bankers Algorithm Dead Lock Prevention.
6. Write a program to simulate Producer-Consumer problem.
7 Simulate all Pagere placement algorithms.

a) FIFO
b) LRU
c) LFU
d) Optimal

8. Simulate Paging Techniques of memory management .
9. Simulate the following disksc heduling algorithms

a) FCFS
b) SSTF
c) SCAN
d) CSCAN

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SEMESTER-IV

COURSE-9: DATABASE MANAGEMENT SYSTEM

Theory	**Credits: 3**	**3 hrs/week**

Course Objectives:

The course aims to help the Students will have the expertise in analysing real time problems and providing appropriate solutions related to Computer Science & Engineering. The students will have the knowledge of fundamental principles and innovative technologies to succeed in higher studies and research. They continue to leam and to adapt technology developments combined with deep awareness of ethical responsibilities in profession.

Learning Outcomes:

An ability to apply Knowledge of computing and mathematics in Computer Science &Engineering. They will analyse a problem, identify and define the computing requirements appropriate to its solution. An ability to design, implement and evaluate a computer-based system to meet desired needs with appropriate societal considerations. They will have knowledge on to conduct investigations, interpret data and provide conclusions in investigating complex problems related to Computer Science & Engineering. An ability to engage in continuing professional development and lifelong leaming.

Unit l: Overview of Database Systems: Introduction: Introduction to data, information, File based system, Drawbacks of filebased system, database, database management systems, Objectives of DBMS, classification of Data Base Management Systems, Services of Database System.

Unit 2: Relational Model: Advantages of DBMS, components of database system, Database users, Introduction to relational model, Codd's rules, concept of keys, constraints (Domain, Entity, Referential)

Unit 3: Entity Relationship Model Introduction, The Building Blocks of an Entity-Relationship, Classification of Entity Set, Attribute Classification, Relationship Degree, Relationship Classification.

Unit 4: BASIC SQL: SQL data types, SQL literals, operators, DDL operations (create, alter, drop), DML operations (insert, delete, update), queries, aggregate functions, TCL operations: commit, Rollback, Save point, DCL operations: Grant, Revoke.

Unit 5: PL/SQL: Introduction, Structure of PUSQL program, Steps to Create a PL/SQL program, Data types of PL/SQL, PL/SQL operators, Control Structures: conditional control statements (if, if..else), Iterative Control statements (while, do.. while, for.)

Suggested Text Books a Database Management Systems, 3'dEdition, Raghurama Krishnan, Johannes Gehrke, TMH SQL, PL/SQL The Programming language of ORACLE, MN Bayross, BPB Publications.

SEMESTER.IV

COURSE 9: DATABASE MANAGEMENT SYSTEM

Practical **Credits: I** **2 hrs/week**

LIST OF EXPERIMENTS

SQL: Employee Database Aim: An enterprise wishes to maintain a data base to automate its operations. Enterprise divided into certain departments and each department consists of employees, The following two tables describe the automation schemas.

Aim: An enterprise wishes to maintain a data base to automate its operations. Enter prise is divided into certain departments and each department consists of employees, The following two tables describe the automation schemas.

Emp(Emp no, Ename, Job, Mgr, Hiredate, Sal, Comm, Dept no) Dept(Deptno Dname, Loc

- List the details of employees who have joined before the end of September 'gl.
- List the name of the employee and designation of the employee, who does not reopen to anybody.
- List the name, salary and PF amount of the employees (pF is circulated asr0o/of salary)
- List the names of employees who are more than 2 years old in the organization.
- Determine the number of employees, who are taking commission, Update the employee salary by 20yqwhose experience is greater than 12 years.
- Determine the department does not contain any employees.
- create a view, which contains employee name and their manager names work)
- List the department numbers and number of employees in each department

PL/SOl. PROGRAMS

- Write a PUSQL program to check the given string is palindrome or not.
- The HRD manager has decided to raise the employee salary by 15% urite a PL/SQL block to accept the employee number and update the salary of that employee.
- Display appropriate messages based on the existence of the record in the Emp table. write a PL/SQL programmes
- to display the top rows in the Emp table based on their job and salary.
- write a PUSQL program to raise the employee salary by 10% for department number 30 people 8nd also maintain the raised details in the raise table.

SEMESTER-IV

COURSE-10: Object Oriented Software Engineering

Theory **Credits: 3** **3 hrs/week**

Course Objective:

To introduce object-oriented software engineering (OOSE) - which is a popular technical approach o analysing, designing an application, system, or business by applying the object- oriented paradigm and visual modelling Course Outcomes: Upon successful completion of the course, a student will be able to

l. Understand and apply the fundamental principles of Object-Oriented Programming (OOP) concepts and Unified Modelling Language (UML) basics 'in the development of software solutions.

2. Analyze and specify software requirements, develop use cases and scenarios, apply object. oriented analysis and design (OOAD) principles.

3. Familiar with the concept's test-&even development (TDD) and its practical implementation.

4. Analyse and Evaluate Software Maintenance and Evolution Strategies 5. Apply Advanced Object-Oriented Software Engineering Concepts.

UNIT-I

Introduction to object-oriented programming: overview of software engineering, Introduction to Object-Oriented Programming (Classes, objects, inheritance polymorphism) Unified Modelling Language (UML)basics, introduction to software development process and software development life cycle (SDLC).

UNIT-II

Requirements Analysis and Design: Requirements analysis and specification Use cases and scenarios, Object-oriented analysis and design (OOAD)' Design pattens' UML modelling techniques (class diagrams, sequence diagrams, state machine diagrams' activity diagrams).

UNIT-III

Software construction and resting: Software construction basics, object-oriented design principles, Object oriented programming languages (Java, C++' Python)' Software testing basics (unit testing' integration testing, system testing), Test-driven development (TDD).

UNIT-IV

Software Maintenance and Evolution: Software maintenance basics' refactoring techniques Software version control, Code review and inspection, Software evolution and reengineering

UNIT-V

Advanced Topics in object-oriented Software Engineering: Model-driven engineering (MDE), Aspect-oriented programming (AOP), Component-based software engineering (CBSE)' Service oriented architecture (SOA), Agile software development and Scrum methodologies.

Text Books

l. An Introduction to object-oriented Analysis and Design and the unified Process, 3rd Edition, Craig Larman, Prentice-Hall.

2. Programming in Java by Sachin Malhotra, Oxford University Press

Reference Books

l. Requirements engineering: processes and techniques, G.Kotonya and, l.Sommerville, 1998' Wiley

2. Design Patterns, E.Gamma, R. Helm, R. Johnson, and J Vlissides

3. The Unified Modeting Language Reference Manual , J.Rumbaugh 'I.Jacobsonand G. Booch, Addison Wesley

SEMESTER-IV

COURSE-10: Object Oriented Software Engineering

Practical **Credits: 1** **2 hrs/week**

Suggested software Tools: Star UML/UML Graph/ Top cased /umbrello /Argo UML/Eclipse IDE, Visual Paradigm for UML/Rational Software Architect/Any other Open Source Tool

List of Experiments: Select domain of interest (e.g. College Management System) and identify multitier software application to work on (e.g. Online Fee Collection). Analyse, design and develop this application using OOSE approach:

I. Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).

2. Understanding of System modelling:

Data modeli.e.ER Diagram and draw the ER Diagram with generalization, specialization and aggregation of specified problem statement

3. Understanding of System modelling: Functional modelling: DFD level0i.e. Context Diagram and draw it

4. Understanding of System modelling: Functional modelling: DFD level I and DFD level

2and draw it.

5. Identify use cases and develop the use case model.

6. Identify the business activities and develop an UML Activity diagram.

7. Identity the conceptual classes and develop a domain model with UML Class diagram.

8. Using the identified scenarios find the interaction between objects and represent the musing UML Interaction diagrams.

9. Draw the state chart diagram.

10. Identify the user interface, domain objects, and technical services. Draw the partially average, logical architecture diagram with UML package diagram notation.

I l. Implement the technical services layer.

I 2. Implement the domain objects layer.

I 3. Implement the user interface layer.

14. Draw component and deployment diagrams.

SEMESTER-IV

COURSE-11: Data Communication and Computer Networks

Theory **Credits: `3** **3 hrs/week**

Course Objectives

To provide students with a comprehensive understanding of networking principles, protocols, and technologies, enabling them to design, analyze, and evaluate efficient and reliable network solutions.

Course Outcomes

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

1. Understand and apply network applications, hardware, software, and reference models for network communication.
2. Design and analyse data link layer protocols, multiple access protocols, and wireless LAN technologies.
3. Design routing algorithms, congestion control algorithms, and evaluate network layer protocols for internetworking.
4. Analyse transport service, transport protocols, and evaluate UDP and TCP in the internet.
5. Understand and evaluate application layer protocols, including DNS, email, WWW, and network management protocols.

Unit-1

Introduction: Network applications, network hardware, network software, reference models: OSI, TCP/IP, Internet, Connection oriented network - X.25, frame relay.

The Physical Layer: Theoretical basis for communication, guided transmission media, wireless transmission, the public switched telephone networks, mobile telephone system.

Unit-II

The Data Link Layer: Design issues, error detection and correction, elementary data link protocols, sliding window protocols, example data link protocols - HDLC, the data link layer on the internet.

The Medium Access Sublayer: Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, Bluetooth.

Unit-III

The Network Layer: Network layer design issues, routing algorithms, Congestion control algorithms, Internetworking, the network layer in the internet (IPv4 and IPv6), Quality of Service.

Unit-IV

The Transport Layer: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP.

UNIT-V

The Application Layer: Domain name system, electronic mail, World Wide Web: architectural overview, dynamic web document and http.

APPLICATION LAYER PROTOCOLS: Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet.

Text Book(S)

1. S. Tanenbaum (2003), Computer Networks, 4th Edition, Pearson Education/ Phi, New Delhi, India

Reference Books

2. Behrouz A. Forouzan (2006), Data communication and Networking, 4th Edition, Mc Graw-Hill, India.
3. Kurose, Ross (2010), Computer Networking: A top down approach, Pearson Education, India.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Hands-on exercises to configure network applications

Evaluation Method: Practical skills in configuring network applications, hardware, and software.

Unit 2: Activity: Protocol Design and Simulation using simulation tools like NS-3 or Cisco Packet Tracer.

Evaluation Method: Students' ability to design and simulate data link layer protocols and multiple access protocols

Unit 3: Activity: Guest Lectures and Workshops on routing algorithms, congestion control, and network layer protocols.

Evaluation Method: Students' participation and understanding demonstrated in guest lectures and workshop

Unit 4: Activity: Network Monitoring and Traffic Analysis using tools like Wireshark

Evaluation Method: Understanding of transport protocols through their analysis ofnetwork traffic and identification of UDP and TCP behavior

Unit 5: Activity: Group Projects on Network Application Development

Evaluation Method: Group Project Presentations

SEMESTER-IV

COURSE-11: Data Communication and Computer Networks

Practical	**Credits:1**	**2 hrs/week**

List of Experiments:

l. Understanding various network tool using Windows and Linux

2. Study different types of Network devices and Cables

3. Building a local Area Network

4. Concept of Network lP Address

5. Introduction to Network Simulator-Packet Tracer (PT)

6. Configuration of a Router using Packet Tracer

7. Implementation of a Network using Packet Tracer

8. Implementation of Static Routing using Packet Tracer

9. Implementation of RlP using Packet Tracer

10. Implementation of OSPF using Packet Tracer

I l. Implement DNS using packet tracer

I 2. Implementation of a VLAN using Packet Trace

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B.COM. COMPUTER APPLICATIONS (MAJOR)

SEMESTER-I

COURSE 2: Fundamentals of Information Technology & Office Automation

Theory Credits: 3 3 hrs/week

Course Objectives

l. Understand foundational computing concepts including number systems, evolution of computers, and architectural components.

2. Explore basic computer organization and network fundamentals, recognizing device functions, system types, and internet components.

3. Demonstrate proficiency in word processing and presentation tools, applying formatting techniques and design elements for professional outputs.

4. Develop competency in spreadsheet operations, employing formulas, charts, and data-handling techniques.

5. Apply advanced data modelling and productivity features to analyse and visualize data efficiently using modem tools.

Course Outcomes:

Learners will be able to:

l. Convert between binary, decimal, octal, and hexadecimal systems, and explain computer evolution and generations with examples.

2. Leamers will demonstrate basic blocks of a computer and fundamental networking knowledge.

3. Create professional-level documents and design visually appealing presentations using word processing software and presentation software.

4. Manipulate data within spreadsheets, apply formulas, and generate accurate summaries and visualizations.

5. Apply data modelling techniques to analyse, organize, and represent data effectively in various

Unit-I: Number Systems, Evolution , Block Diagram and Generations

Number Systems: Binary, Decimal, Octal, Hexadecimal; conversions between number systems

Evolution of Computers: History from early mechanical devices to modern-day systems.

Block Diagram of a Computer: Input Unit, Central Processing Unit, Memory Unit, Output Unit.

Generations of Computers: First to Fifth Generation - Technologies, Characteristics, Examples

Protocols, Networking Devices. Types of Computer Networks : LAN, WAN, MAN.

Internet Basics: History IP Address, URL, WWW, Web browsers, Search engines, E-mail Internet Security

Unit-III: Word Processing Basics: Definition Using Microsoft Word / Google Docs. Templates for resumes, letters, reports. Basic text editing and formatting - Typing and editing text, Font styles, sizes, colors, and effects, Paragraph alignment, indentation, and spacing, Bullets, numbering, and text highlighting, Templates for resumes, letters and reports. Working with Tables 8nd Graphics- Inserting and formatting tables, Adding images, shapes, icons, and SmartArt, Text wrapping and positioning graphics

Document Layout and Design - Page setup, Headers, footers, and page numbering, Section breaks and columns, Applying themes and styles. Advanced Features - Spell check and grammar tools, Thesaurus, and Mail merge.

Presentation Tools: Using PowerPoint/Google Slides - Creating, Saving and Opening presentations, Adding, deleting, and rearranging slides, Slide layouts and design themes, Using templets and master slides, Slide sorter and outline view, Applying transitions and Animations, Digital and Layout.

Applications: Creating resumes, Reports, Brochures, and Presentations.

Unit-IV: Spread sheet Basics Spreadsheet Concepts: Understanding rows, columns, cells in tools like MS Excel/Google Sheets, Workbook, Worksheet, Cell referencing- Relative, Absolute, Mixed.

Functions and Formulae: Mathematical, Statistical, logical Text, Date and Time, Financial.

Lookup and Reference : VLOOKUP, HLOOKUP

Visual representations: Creating a chart, common chart types, Column Chart, Bar Chart, Line Chart, Pie Chart, Scatter Chart, Histogram.

Data Handling: Sorting data, Filtering data, Grouping Data, Conditional formatting: Data Bars, Color Scales, Icon Sets, Custom Formulas.

Unit-V: Data Modelling Data Analysis Tools: Pivot Tables and Pivot Charts, Data Validation (Drop-downs, Input Messages, Error Alerts), What-If Analysis : Goal Seek, Scenario Manager, Data Tables

Charts and Dashboards: Creating Interactive Dashboards, Using slicers with Pivot Tables, Combo Charts and Sparklines.

Text Books: l. Thareja, R. (Second Edition). Fundamentals of Computers. Oxford University Press.

2. Rajaraman, V. (n.d.). Fundamentals of Computers. PHI Learning.

3. Norton, P. (2017). Introduction to Computers (7th ed.). McGraw Hill Education.

4. Nordell, R, Stewart, K., Easton, A., Graves, P. R., & Triad Interactive, lnc. (2022). Microsoft Office 365: In Practice (1st ed.). New York: McGraw Hill Education.

B.COM. COMPUTER APPLICATIONS (MAJOR)

SEMESTER-I

COURSE 2: Fundamentals of Information Technology & Office Automation

Practical Credits: 1 2 hrs/week

List of Experiments:

1. Demonstration of Assembling and Dissembling of Computer Systems.
2. Identify and prepare notes on the type of Network topology of your institution.
3. Prepare your resume in Word by using the Resume template.
4. Using Word, write a letter to your higher official seeking l0-days leave.
5. Create a multi-page academic report and format it using headers and footers. The header will include the document title and author name, while the footer will contain page numbers and the date.
6. Prepare a formal invitation letter and use Mail Merge to personalize it for a list of recipients.
7. Prepare a report that includes: A table summarizing sales data, A graphic (image or chart) illustrating product performance with the proper formatting and alignment of both elements
8. Create a PowerPoint Presentation on the Role of AI in Business Decision-Making.
9. Using a spreadsheet, prepare your class Time Table.
10. Using a Spreadsheet, calculate the Gross and Net salary of employees(Min 5) considering all the allowances.
11. Generate the class-wise and subject-wise results for a class of 20 students. Also generate the highest and lowest marks in each subject.
12. Using IF, AND, OR, and IFERROR to Alternate Grade Evaluation.
    a. Create a table of student scores in different subjects.
    b. Use IF to assign grades (dts/C/Fail).
    c. Use IF ERROR to handle missing scores or invalid data.

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SEMESTER-II

COURSE 4: E-COMMERCE AND WEB APPLICATION DEVELOPMENT

Theory Credits: 3 3 hrs/week

Course Objectives:

1. Understand the evolution, types, and models of e-commerce, including technical, legal, and ethical frameworks. Explore web design technologies and content management systems relevant to e-commerce platforms.

2. Apply online marketing principles, SEO techniques, and e-payment systems with attention to logistics and risk arrangement.

3. Design interactive and responsive websites using HTML5, CSS3, and client-side scripting with JavaScript.

4. Develop and customize CMS-based interfaces using the Bootstrap framework and responsive design principles

Learners will be able to:

1. Describe e-commerce models, revenue strategies, and legal considerations including cyber laws and data privacy.
2. 2. Implement basic web structures using HTML5 and apply web design principles suitable for digital commerce.
3. Create and style dynamic websites using CSS for layout, animation, and visual enhancements.
4. Write client-side scripts using JavaScript to enable interactivity, form validation, and event handling.
5. Build responsive e-commerce front-ends using the Bootstrap framework, incorporating reusable UI components and custom styling.

UNIT 1: Introduction to E-Commerce: Definition, scope, and evolution, Benefits and limitations Types of E-Commerce: B2B, B2C, C2C, CZB, G2C models

E-Commerce Business Models: Revenue models (advertising, subscription, etc.) **Infrastructure for E-Commerce:** Internet, intranet, Extranet

Payment gateways and digital wallets Legal and Ethical Issues: Cyber laws and data privacy, Intellectual property, taxation, and security.

Case study: Study of successful e-businesses.

UNIT-II Technology in E-Commerce: Essentials of web design for business - Content management systems (WordPress, Shopify, Boot Strap) Digital Payment Systems: Credit/Debit Cards, Net Banking, Mobile Wallets, UPI, Electronic Fund Transfer (EFT) , Payment Gateways - Blockchain and Cryptocurrencies, Artificial Intelligence and E-Commerce, Future of E-Commerce. Web Designing: Web designing Principles, Introduction to IITMLS, HTML Document Structure, Formatting Elements (text and block formatting), Lists, Images, Links and Navigation (External and internal links), Tables, Inline frames, HTML Forms. Embedding multimedia objects.

UNIT III : Cascadlng Style Sheets CSS Basics: CSS Rule, Applying CSS Rules (Selectors), Embedding CSS code in HTML page. Inline, internal, external style sheets.

CSS Properties: Font, Color, Types of CSS Color values, Background, CSS Box Model Display properties, Styling Pseudo Elements, Positioning properties, Layering, Styling Lists and tables.

UNIT IV: Client Side Scripting using JAVA SCRIPT Java script Basics: Datatypes, Variables, Operators, Control Statements, Functions. Built in Objects: Arrays, String, Date, Window, Document, Reg Ex. Document Object Modelling: Introduction to DOM, Form Validation using Java Script, Event Handling: Mouse events, form submission events, load and unload events, keyboard events- focus and blur events.

UNIT V: BOOTSTRAP FRAMEWORK for designing CMS Responsive Web design: Grid Systern6 Breakpoints, Containers, Utilities. Introduction to BOOT STRAP FRAM f,, WORK: Benefits, Setup Bootstrap Project. Boot Strap Components: Navigation, Creating navigation bars (.navbar), Dropdowns, and Responsive togglers.Styling buttons with various classes for size, color, and state. Forms Styling form elements like inputs, labels, and client side validation. Carousels-Creating image sliders.

TEXT BOOKS & REFERENCE BOOKS

1. Whiteley, D., 2000. E-commerce: Strategt, technologies and applications. McGraw Hill Education.

2. Turban, E&aim, David King, Jae Kyu ke, Ting-Peng Liang, and Deborrah Turban. Electronic Commerce: Concepts, Models, Stalegies. Pearson Educatiott' 2002.

3. Robbins, Jennifer Niederst. Leaming Web Design: A Beginner's Guide to HTML, CSS' Javascipt, and Web Graphics.5th ed., O'Reilly Media, 2018.

4. Kogent Leaming Solutions Inc. Web Technologies Black Book. Dreamtech Press, 2009'

SEMESTER-II

COURSE 4: E-COMMERCE AND WEB APPLICATION DEVELOPMENT

Practical Credits: 1 2hrs/week

List of Experiments:

l. Create a simple HTML page with: Headings, paragraphs, bold./italic text 2 hrs/week

2. Create a music promotion webpage (include audio and video files in your html page)

3. Create an online registration form

4. Create Grocery Lists for an E-commerce Website

5. Create a Blog Article with Text Formatting (sample tasks: Bold the title; Italicize author name; Highlight key points, Use subscript /superscript for scientific terms. High ligths the impatient lines etc)

6. Create a static product gallery page that displays 4 product images in a grid layout (using HTML tables)

7. Create an interactive rnap using and tags where clicking on different areas navigates to different pages.

8. Demonstrate the usage of hyper links : intra hyper links, external and internal hyperlinks 9. Create a table with columns: Bus No, Route, Departure Time, Arrival Time for 5 buses. 10. Demonstrate the usage of frames. I l. Demonstrate Layout Design Using CSS Box Model. 12. Demonstrate linking an external CSS file to style a multi-page college website. 13. Demonstrate Styling Text, Colors, and Backgrounds.

14. Demonstrate CSS animation on page elements(text,images etc)

15. Create a webpage to Design an image gallery page for an art exhibition.(Apply transitions and transforms for interactive effects like scale transform when an image is hovered- Rotate an image slightly when clicked- Smooth transitions for hover effects)

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SEMESTER-III

COURSE-7: E-COMMMERCE AND WEB DESIGNING

Theory **Credits: 3** **3hrs/week**

Course Objectives: The course aims to help leaners to acquire conceptual knowledge of fundamental concept of E- commerce & Web Designing. Emphasize the importance of various E-commerce & Web Designing. Developing and implementing efficient algorithms.

Learning Outcomes: The student will be able to Explain how to create an e-commerce website from scratch, using PHP and the Bootstrap framework. Display featured products correctly on a web page, using the bootstrap system. Explain how product detail models are programmed to be dynamic.

Unit I:

Introduction: Electronic commerce: Definition, types, advantages and disadvantages, E-commerce transaction on World Wide Web Electronic Market-Online shopping, Three models of Electronic Market - E-Business.

Unit-II:

E-payment System: Models and methods of e-payments (Debit Card, Credit Card), Digital Signatures (procedure, Working), Payment Gateways, online Banking (Meaning, concepts, Importance), Advantages and Disadvantages of online transactions

Unit-III:

On Line Business Transactions: E-commerce Applications in various Industries (Banking, Insurance, payment of Bills), Benefits, Problems and Features, online Services (Financial, Travel), online Leaming, online Shopping (Amazon, Flipkart)

Unit-IV:

Website Designing: Introduction to Internet: Internet Terminology - History of the Internet - Advantages & disadvantages of Internet Introduction to HTML: Basic HTML - HTML document structure - HTML tags - head tag - title tag - body tag - Horizontal Rule Tag - paragraph tag - Text formatting tags - character entities.

Unit V:

Website Designing: HTML Lists : Ordered List , Unordered List - Using colors -Using Images Hyperlinks: Textual links, Graphical links, types of document links, anchor tag. HTML Tables, table creations tags, nested tables

References:

(l) E-commerce and E-business Himalaya publishers

(2) E-Commerce by Kenneth C Laudon, PEARSON INDIA

(3) Web Design: Introductory with Mind Tap Jennifer T Campbell, Cengage India

(4) HTML & WEB DESIGN: TIPS & TECHNIQUES JAMSA, KRIS, McGTaw HILL

(5) Fundamentals Of Web Development by Randy Connolly, Hoar, Pearson

(6) HTML & CSS: COMPLETE REFERENCE POWELL, THOMAS. Mc GTAW HILL

SEMESTER.III

COURSE-7:E-COMMMERCE AND WEB DESIGNING

Practical **Credits:1** **2 hrs/week**

LIST OF EXPERIMENTS

1. creates a web page to display a hyperlink which when clicked directs you to Amazon website.
2. create a web page to demonstrate your college name aligned with the logo of your college
3. Create a web page to demonstrate definition lists taking various applications of e" or*".." u. un example.
4. Create a web page which asks for mode of payment which includes the options: Credit card/Debit card/Online transfer (use radio buttons)
5. Create a web page which asks the user to enter his credit card details. Use textboxes, drop down buttons.
6. Create a web page to display definition list which defines the terms: B2B, B2C, CZB, CZC.
7. create a web page which displays four buttons containing text B2B, B2C C2B,C2C. Also when a button is clicked details about the clicked subject should appear on a separate page.
8. create a web page to display the text "Digital Marketing"
9. create a web page to scroll the text 'E-Commerce" for exactly 5 times from left io right of the screen
10. create a web page to insert an image which when clicked redirects you to your college website.
11. Create a web page to display the name of your college in h6 size with blue as font color and background color yellow separated by a thick line and below which a paragraph about the facilities offered by your college is described.
12. create a web page to demonstrate a pull-down menu. The menu contain the list of your favorite south Indian dishes.
13. create a web page with name of your college as text. The text should scroll, alternate and slide.
14. Create a web page to display an image surrounded by text on all the four sides.
15. Create a web page to display 3 images which are aligned left, right and center respectively.

SEMESTER-III

COURSE-8: Digital Marketing

Theory **Credits: 3** **3hrs/week**

Course Objectives:

The course aims to identify the impact of digital space and digital marketing in reaching out to customers. Understand the importance of Search Engines and explain the working of Search Engines. Able to Define email Marketing and have knowledge on how Social Media Marketing is to be used by marketers

Learning Outcomes:

The Students will be able to:

Use digital media for the creation of products and services and relate Search Engines in the digital marketing ecosystem. Use Search Engine Marketing for advertisements and know the Social Media platforms like Face book, Twitter, YouTube & LinkedIn for Marketing. Outline email Marketing and strategy to craft email marketing campaign.

UNIT 1:

Digital Marketing: Introduction to Digital Marketing. Traditional Vs. Digital Marketing, Technology behind Digital Marketing, Characteristics of Digital Marketing, Digital Marketing Strategy, Understanding Digital
Consumer**.**

Case Study: Analys the change in ranking of your Web Promotion Page

Unit 2:

Online Advertising: Introduction, Objective, Where to Advertise, Online AdFormat, Search Engine Ad, Networkk Advertising, Affiliate Programs, Landing Pages

Case Study: Create Google Add for your college

UNIT 3:

Email Marketing: Introduction, Types of Email, Email Marketing Campaign Process, Email marketing Tools, Advantages and Disadvantages, Opt-in Email Advertising, Email tracking

Case Study: Analys the impact of your E-Mail Campaign

UNIT 4:

Social Media Marketing (SMM):

What is Social Media Marketing, Seven Myths of SMM, Characteristics of Successful Social Media Marketer,Social Media Marketing plan, Social Media marketing Tools, Publishing Blogs, Podcast and Webinars, Social Media Monitoring, Social Media: Face book, Twitter?

Case Study: Analys the performance of your Facebook and Instagram Page

UNIT 5:

Search Engine Optimization (SEO): Understanding SEO, Search Engine Optimization Process – Goals, On-Page Optimization, Off-Page Optimization and Analyze, Search Engine Result Process (SERP), SEO Tools.

Case Study: Analys the impact of your Twitter Campaign

Text Books:

1. Digital Marketing by Seema Gupta, McGraw Hill Education
2. Fundamentals of Digital Marketing by Punit Singh Bhatia, Pearson

References:

1. Basics of Digital Marketing - Course (swayam2.ac.in)

SEMESTER-III
COURSE-8: Digital Marketing

Practical **Credits: 1** **2hrs/week**

LIST OF EXPERIMDNTS

1. Digital Marketing Implementation in Business Scenario
2. Create the Digital Marketing Webpage
3. Conducting the Search Engine Optimization and Search Engine Marketing
4. Using Google Analytics to analize website performance
5. Creating Promotional banner through Canva Face book Promotion using banners
6. Creating YouTube Channel for Marketing
7. Twitter Marketing
8. Instagram Marketing
9. Email Market in

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SEMESTER-IV

COURSE-II: DATABASE MANAGEMENT SYSTEM WITH ORACLE

Theory **Credits: 3** **3hrs/week**

Course Objectives:

The course aims to help the Students will have the expertise in analyzing real time problems and providing appropriate solutions related to Computer Science & Engineering. The Students will have the knowledge of fundamental principles and innovative technologies to succeed in higher studies and research. They continue to leam and to adapt technology developments combined with deep awareness of ethical responsibilities in profession.

Learning Outcomes:

An ability to apply Knowledge of computing and mathematics in Computer Science &Engineering. They will analyze a problem, identify and define the computing requirements appropriate to its solution. An ability to design, implement and evaluate a computer-based system to meet desired needs with appropriate societal considerations. The will have knowledge on to conduct investigations, interpret data and provide conclusions in investigating complex problems related to Computer Science & Engineering. An ability to engage in continuing professional development and life long learning

Unit l:

Overview of Database Syste

Introduction: Introduction to data, information, File based system, Drawbacks of file based system, database, database management systems, Objectives of DBMS, classification of Data Base Management Systems, Services of Database System.

Unit 2:

Relational Model:

Advantages of DBMS, components of database system, Database users, Introduction to relational model, Codd's rules, concept of keys, constraints (Domain, Entity, Referential)

Unit 3:

Entity Relationship Model Introduction,

The Building Blocks of an Entity-Relationship, Classification of Entity Set, Attribute Classification, Relationship Degree, Relationship Classification

Unit 4:

BASIC SQL:

SQL data types, SQL literals, operators, DDL operations (create, alter, drop), DML operations (insert, delete, update), queries, aggregate functions, TCL operations: commit, Rollback, Save point , DCL operations: Grant, Revoke

Unit 5:

PL/SQL:

Introduction, Structure of PUSQL program, Steps to Create a PL/SQL program, Data types of PL/SQL, PL/SQL operators, Control Structures: conditional control statements (if, if..else), Iterative Control statements (while, do..while, for)

Suggested Text Books:

- Database Management Systems, 3'dEdition, Raghurama Krishnan, Johannes Gehrke, TMH
- SQL,PUSQL The Programming language of ORACLE, MN Bayross, BPB Publications.

SEMESTER-IV
COURSE-II: DATABASE MANAGEMENT SYSTEM WITH ORACLE

Practical **Credits: 1** **2hrs/week**

LIST OF EXPERIMENTS

SQL:

Employee Database

Aim: An enterprise wishes to maintain a data base to automate its operations. Enterprise is divided into certain departments and each department consists of employees, The following two tables dese be the automation schemas,

Emp(Emp no, E name, Job, Mgr, Hiredate, Sal, Comm, Dept no) Dept(Dept no Dname, Loc)

1. List the details of employees who have joined before the end of September 81.
2. List the name of the employee and designation of the employee, who does not repon to anybody.
3. List the name, salary and PF amount of ar the employees(pF is calculated asr0o/of salary)
4. List the names of employees who are more than 2 years old in the organization. Determine the number of employees, who are taking commission, Update the employee salary by 20yqwhose experience is greater than 12 years.
5. Determine the department does not contain any employees.
6. create a view, which contains employee name and their manager names worl
7. Update the employee salary by 20% whose experience is greater than 12 years

PUSQL program

- Write a PUSQL program to check the given string is palindrome or not.
- The HRD manager has decided to raise the employee salary by 15% urite a PL/SQL block to accept the employee number and update the salary of that employee.
- Display appropriate messages based on the existence of the record in the Emp table. write a PL/SQL progmm to display the top I o rows in the Emp table based on their job and salary.
- write a PUSQL program to raise the employee salary by lo% for department number 30 people 8nd also maintain the raised details in the rais table

Artificial Intelligence in consonance

SEMESTER-I

COURSE 1: AI FUNDAMENTALS

Learning Objectives:

1. Understand the history and evolution of Artificial Intelligence and Identify major subfields of\ AI.
2. Investigate the role of AI in various industries like healthcare, agriculture, and education.
3. Examine concepts like bias, fairness, transparency, and accountability in AI systems.
4. Explore the integration of AI in scientific research and discuss future directions and evolving trends in AI.
5. Learn how prompt engineering is used in various sectors like education and content creation.

Course Outcomes:

Students will be able to

1. Describe the different subfields and their roles in AI applications.
2. Analyze the benefits and limitations of AI in diverse domains.
3. Evaluate AI systems in terms of inclusivity, privacy, and robustness.
4. Describe Generative AI and emerging technologies like ChatGPT.
5. Apply prompt engineering concepts to various real-world use cases.

Unit I.

AI and its Subfields

Introduction to Artificial Intelligence, History, Definition, Artificial General Intelligence, Industry Applications of AI, Challenges in AI.

Knowledge Engineering, Machine Learning, Computer Vision, Natural Language Processing, Robotics.

Unit II

Applications of AI

Healthcare, Finance, Retail, Agriculture, Education, Transportation.

Unit III

Bias and Fairness in AI Systems

Ethics in AI, Bias and Fairness in AI Systems, Transparency in AI Systems, Accountability, Security, Privacy, Inclusivity, Sustainability, Robustness, Reliability.

Unit IV

AI in Research, Generative AI and prompt engineering

AI in Experimentation and Multi-disciplinary research, Generative AI introduction, ChatGPT, Hugging Face, Gemini and other tools basics, Perplexity, Prompt engineering Definition and its importance, Role of Prompt Engineering in AI/ML Interaction, Emerging trends and Future Directions in AI.

Unit V

Applications of Prompt engineering

Applications of Prompt Engineering: Education, Business & Commerce, Content Creation: AI for Creative Writing, AI for creative design, writing AI scripts for video, generating slides and slides GPT usage, Designing thumbnails and channel branding with AI

Text Books:

1. AI for Everyone: A Beginner's Handbook for Artificial Intelligence (AI) by Saptarsi Goswami, Amit Kumar Das , Amlan Chakrabarti

2. Prompt Engineering for Beginners: by Kapila Arora, Geetu Garg, Gaurav Arora.

References:

1. Let’s Learn Artificial Intelligence: Base Module, Niti Ayog, Atal Innovation Mission.

2. Prompt Engineering for Generative AI: Future-proof inputs for Reliable AI-outputs by James Phoenix & Mike Taylor.

3. Generative AI Tutorial:https://www.w3schools.com/gen_ai/

4. Generative AI 360°: Practical Guide to ChatGPT, Midjourney & AI Tools to Boost Productivity & Creativity , For Professionals, Marketers & Entrepreneurs by Hitesh Motwani , ZebraLearn, 2025.

5. Generative AI: Prompt Engineering Basics:

6. Learn Generative AI Prompt

SEMESTER-III

INFORMATION AND COMMUNICATION TECHNOLOGY

Theory **Credits: 2** **2 Hours/Week:**

Objectives:

This course aims at acquainting the students with basic ICT tools which help them in their day-to-day life as well as in office and research.

Course Outcomes:

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

1. Understand the literature of social networks and their properties.
2. Explain which network is suitable for whom.
3. Develop skills to use various social networking sites like Twitter, Flickr, etc.
4. Learn a few GoI digital initiatives in higher education.
5. Apply skills to use online forums, docs, spreadsheets, etc. for communication, collaboration, and research.
6. Get acquainted with internet threats and security mechanisms.

SYLLABUS

UNIT-I: (08 hrs)

Fundamentals of Internet:

What is Internet?, Internet applications, Internet Addressing – Entering a Web Site Address, URL – Components of URL, Searching the Internet, Browser – Types of Browsers, Introduction to Social Networking:

Twitter, Tumblr, LinkedIn, Facebook, Flickr, Skype, Yahoo, YouTube, WhatsApp.

UNIT-II: (08 hrs)

E-mail:

Definition of E-mail – Advantages and Disadvantages – User IDs, Passwords, Email Addresses, Domain Names, Mailers, Message Components, Message Composition, Mail Management.

G-Suite:

Google Drive, Google Documents, Google Spreadsheets, Google Slides, and Google Forms.

UNIT–III ***(10 hrs)***

Overview of Internet Security

- E-mail threats and secure E-mail
- Viruses and antivirus software
- Firewalls
- Cryptography
- Digital Signatures
- Copyright Issues

What are GOI digital initiatives in higher education?
Examples include:

- **SWAYAM**
- **Swayam Prabha**
- **National Academic Depository**
- **National Digital Library of India**
- **E-Sodh-Sindhu**
- **Virtual Labs**
- **e-Acharya**
- **e-Yantra**
- **NPTEL**

RECOMMENDED CO-CURRICULAR ACTIVITIES *(04 hrs)*

(Co-curricular activities shall not promote copying from textbook or from others' work and shall encourage self/independent and group learning.)

1. **Assignments** (In writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging.)
2. **Student Seminars** (On topics of the syllabus and related aspects – individual activity)
3. **Quiz and Group Discussion**
4. **Slip Test**
5. **Try to solve MCQs available online**
6. **Suggested Student Hands-on Activities:**
    - a. Create your accounts for the above social networking sites and explore them. Establish a video conference using Skype.
    - b. Create an Email account for yourself. Send an email with two attachments to another friend. Group the email addresses using the address folder.
    - c. Register for one online course through any of the online learning platforms like NPTEL, SWAYAM, Alison, Code, Coursera. Create a registration form for your college campus placement through Google Forms.

SEMESTER-IV

CYBER SECURITY

Theory **Credits:** 2 2 **Hours/Week**

Learning Outcomes:

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

Develop an understanding of cybercrimes and various legal perspectives involved. . .

Develop a security model to handle mobile, wireless devices and related security issues of an organization.

Use the cybercrime tools and methods in solving real world problems

UNIT - I:

Introduction to Cybercrime: Introduction, Cybercrime: Definition and origins of the word, cybercrime and Information Security, who are cyber criminals? classifications of cybercrimes, cybercrime: the legal perspectives, an Indian perspective, cybercrime and the Indian IT Act 2000, a Global perspective on Cybercrimes.

UNIT-II:

Cybercrime-Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Authentication Service Security, Attacks on Mobile/Cell Phones. Mobile Devices: Security Implications for organizations, organizational Measures for Handling Mobile Devices-Related Security issues, organizational security Policies and Measures in Mobile Computing .

UNIT-III:

Tools and Methods Used in Cybercrime: Password Cracking, key loggers and Spywares. virus and worms, Trojan Horses and Backdoors, Steganography, attacks on wireless networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ld. Theft).

Text Books:

l. Mark Rhodes, Ousley, Information Security, 1st Edition, MGH,2013.

2. Nina Godbole and Sunit Belpre - Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, 1st Edition Publication Wiley, 201 I Activities Planned: I .Identify a user of interment, label him as a cybercriminal or not. 2. Checklist for reporting cybercrime at Cybercrime Police Station.

3. Checklist for reporting cybercrime online.

4. Reporting phishing emails.

5. Demonstration of email phishing attack and preventive measures.

6. Checklist for secure net banking.