MATHEMATICS

Unit 1

Finite Differences and Interpolation: Forward and backward differences, Interpolation, Newton-Gregory forward and backward interpolation formulae, Lagrange's interpolation formula and Newton's divided difference interpolation formula (no proof).

Numerical Differentiation and Numerical Integration: Derivatives using Newton-Gregory forward and backward interpolation formulae, Newton-Cotes quadrature formula, Trapezoidal rule, Simpson's 1/3rdrule and Simpson's 3/8th rule.

Unit 2

Statistics: Curve fitting by the method of least squares, fitting linear, quadratic and geometric curves, Correlation, Regression, and Multiple Regression.

Probability Distributions: Random Variables, Binomial distribution, Poisson distribution.

Unit 3

Probability Distributions: Uniform distribution, Exponential distribution, Gamma distribution and Normal distribution.

Joint probability distribution: Joint probability distribution (both discrete and continuous), Conditional probability, and Conditional expectation.

Unit 4

Markov Chain: Introduction to Stochastic Process, Probability Vectors, Stochastic matrices, Regular stochastic matrices, Markov chains, Higher transition probabilities, Stationary distribution of Regular Markov chains and absorbing states, Markov and Poisson processes.

Queuing theory: Introduction, Symbolic representation of a queuing model, Single server Poisson queuing model with infinite capacity (M/M/1: /FIFO), when and ( ), Performance measures of the model, Single server Poisson queuing model with finite capacity (M/M/S: N/FIFO), Performance measures of the model, Multiple server Poisson queuing model with infinite capacity (M/M/S: /FIFO), when for all ( ), Multiple server Poisson queuing model with finite capacity (M/M/S: N/FIFO), Introduction to M/G/1 queuing model.

Unit 5

Sampling and Statistical Inference: Sampling distributions, Concepts of standard error and confidence interval, Central Limit Theorem, Type I, and Type II errors, Level of significance, One-tailed and two-tailed tests, Z-test: for single mean, for single proportion, for difference between means, Student's t-test: for single mean, for difference between two means, F-test: for equality of two variances, Chi-square test: for goodness of fit, for independence of attributes.

DATA COMMUNICATION AND NETWORKING

UNIT 1

Data communication Fundamentals: Introduction, components, Data Representation, Data Flow; Networks – Network criteria, Physical Structures, Network Models, Categories of networks; Protocols, Standards, Standards organization; The Internet – Brief history, the Internet today;
Network Models: Layered tasks; The OSI model – Layered architecture, Peer-to-Peer Process, Encapsulation; Layers in the OSI model; TCP/IP Protocol suite; Addressing.

UNIT 2

Digital Transmission Fundamentals (with problems to solve): Analog & Digital data, Analog & Digital signals (basics); Transmission Impairment - Attenuation, Distortion, and Noise; Data rate limits - Nyquist Bit Rate, Shannon Capacity; Performance,
Digital Transmission (with problems to solve): Digital-to-Digital conversion - Line coding, Line coding schemes (unipolar, polar, bipolar);
Analog-to-Digital conversion - PCM.

UNIT 3

Error detection & correction (with problems to solve): Introduction, Block coding, Linear Block codes, Cyclic codes – CRC, Polynomials, Checksum,
Datalink control: Framing, Flow& error control, Protocols, Noiseless channels (Simplest Protocol, Stop-and-wait protocol); Noisy channels (Stop-and-wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ, Piggybacking).

UNIT 4

HDLC – Transfer modes, frames: Point-to-Point Protocol - Framing, transition phases;
Multiple Access: Random Access (Aloha, CSMA, CSMA/CD, CSMA/CA), Controlled Access (Reservation, Polling, Token Passing), Channelization (FDMA, TDMA, CDMA)

UNIT 5

Wired LANs: IEEE standards; Standard Ethernet;
Wireless LANs: IEEE802.11 Architecture, MAC sublayer, addressing mechanism, Bluetooth and its architecture; Connecting devices, Backbone networks, Virtual LANs

DESIGN ANALYSIS AND ALGORITHM

UNIT 1

Asymptotic Bounds and Representation Problems of Algorithms: Computational Tractability: Some Initial Attempts at Defining Efficiency, Worst-Case Running Times and Brute-Force Search, Polynomial Time as a Definition of Efficiency,
Asymptotic Order of Growth: Properties of Asymptotic Growth Rates, Asymptotic Bounds for Some Common Functions, A Survey of Common Running Times: Linear Time, $O(n \log n)$ Time, $O(nk)$ Time, Beyond Polynomial Time. Some Representative Problems, A First Problem: Stable Matching.

UNIT 2

Graphs & Divide and Conquer: Graph Connectivity and Graph Traversal, Breadth-First Search: Exploring a Connected Component, Depth-First Search, Implementing Graph Traversal Using Queues and Stacks: Implementing Breadth-First Search, Implementing Depth-First Search, An **Application of Breadth-First Search**: The Problem, Designing the Algorithm, Directed Acyclic Graphs and Topological Ordering. Divide and Conquer Technique: The Merge Sort Algorithm, Quick Sort Algorithm. (Textbook 2)

UNIT 3

Greedy Algorithms: Interval Scheduling: The Greedy Algorithm Stays Ahead: Designing a Greedy Algorithm, Analysing the Algorithm, Scheduling to Minimize Lateness: An Exchange Argument: The Problem, Designing the Algorithm, Designing and Analysing the Algorithm. (Textbook 1)
Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees and Codes (Textbook 2)

UNIT 4

Dynamic Programming: Weighted Interval Scheduling: A Recursive Procedure: Designing a Recursive Algorithm, Subset Sums, and Knapsacks: Adding a Variable: The Problem, Designing the Algorithm. (Textbook 1)
Iterative Improvement: The Simplex Method, The Maximum-Flow Problem. (Textbook 2)

UNIT 5

NP and Computational Intractability: Polynomial-Time Reductions NP-Complete Problems: Circuit Satisfiability: A First NP-Complete Problem, General Strategy for Proving New Problems NPComplete, Sequencing Problems: The Traveling Salesman Problem, The Hamiltonian Cycle Problem.

ARTIFICIAL INTELLIGENCE

UNIT 1
Introduction: Why study AI? What is AI? The Turing tests. Rationality, Branches of AL Brief history of AI Challenges for the future.
What is an intelligent agent? Doing the right thing (rational action). Performance measure. Rational agent, Rationality, Environment and agent design, Structure of Agents, Examples of Agent, Environment types, PEAS, Agent types-simple reflex, model, Goal and Utility-based agents, implementation of these agents in C++/Python, Problem-Solving Agents, Search problems and solutions, Standardized problems-grid world problem (two-cell vacuum world, sliding-tile puzzle).

UNIT 2
Uninformed Search: Depth-first, Breadth-first, Uniform-cost, Depth-Limited Search, Iterative Deepening Depth-First Search, Bidirectional Search,
Informed search: Best-first, A* search, Heuristic search.

UNIT 3
Problem reduction: AO* algorithm, **Game Playing:** Minimax algorithm, Alpha-beta pruning.
Agents that reason logically 1: Knowledge-based agents (KBA), the architecture, Implementation of KBA, the Wumpus world, simple knowledge base, simple inference procedure, First-order logic.

UNIT 4
Advanced problem-solving paradigm
Planning: types of planning systems, block world problem, logic-based planning, Algorithms, Linear planning using a goal stack, Means-ends analysis, and Nonlinear planning strategies.

UNIT 5
Knowledge Representation, Expert system Approaches to knowledge representation, knowledge representation using semantic networks, extended semantic networks for KR, Knowledge representation using Frames.
Expert system: introduction phases, architecture of Expert systems, Expert systems versus Traditional systems, characteristics of Expert systems, Advantages, and disadvantages, Implementation of an Expert system in Python, Applications of Expert Systems.

OPERATING SYSTEM

UNIT 1
Introduction: What operating systems do; Computer System organization;
Computer System architecture; Operating System structure; OS operations;
Operating system structures: Operating System services, user operating system Interface,
System calls, Types of system calls, Operating system structure, System boot.

UNIT 2
Process Management: Basic concept; Process scheduling; Operations on processes; Inter
process Communication.
Threads: Overview; Multithreading models;
Process scheduling: Basic concepts, Scheduling criteria, scheduling algorithms,
multiple processor scheduling, Algorithm evaluation.

UNIT 3
Process Synchronization: Synchronization, The Critical section problem;
Peterson's solution; Synchronization hardware; Semaphores; Classical problems of
synchronization; Monitors.
Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock
prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

UNIT 4
Memory Management Strategies: Background; Swapping; Contiguous memory allocation;
Paging; Structure of page table; Segmentation.
Virtual Memory Management: Background; Demand paging; Copy-on write;
Page replacement; Allocation of frames; Thrashing.

UNIT 5
File System: File concept; Access methods; Directory structure; File system
mounting; file sharing; protection.
Secondary Storage Structures: Disk scheduling; FCFS Scheduling, SSTF scheduling, SCAN, C-
SCAN scheduling, Look Scheduling, CLOOK scheduling.
System Protection: Goals of protection, Principles of protection, Domain of protection, Access
matrix.

EMBEDDED SYSTEM LAB

1. Design and Develop a program to control an led ON and OFF using an Arduino.

2. Design and Develop a program to control an led ON and OFF using a push button in an Arduino.

3. Design and Develop a program to control an led ON and OFF using a potentiometer in an Arduino.

4. Design and Develop a program to generate a sound with a Buzzer in an Arduino.

5. Design and Develop a program to control multiple LEDs Sequentially using an Arduino.

6. Design and Develop a program using Arduino to Interface with a DHT11 Sensor and Display the Temperature and Humidity Readings.

7. Design and Develop a program using Arduino to Interface with a PIR Sensor to detect and respond to motion.

8. Design and Develop a program using Arduino to Interface with an LM35 Sensor and Display the Temperature Readings.

9. Design and Develop a program to control an led ON and OFF using an ESP8266 Node MCU.

10. Design and Develop a program using ESP8266 NodeMCU to Interface with a DHTII Sensor and Display the Temperature and Humidity Readings.

ALGORITHM LAB

1. GCD

2. Linear Search and Binary Search

3. Bubble Sort and Insertion Sort

4. Merge Sort

5. Quick Sort

6. BFS

7. DFS

8. Prims

9. Kruskal

10. Dijkstra

11. Knapsack

12. Travelling Salesman

DEPARTMENT OF CSE (AI&ML) AND CSE (CS)
WEB TECHNOLOGIES LABORATORY MANUAL

Sl. No	List of programs
1.	Design the following static web pages required for an online book store web site. 1. **HOME PAGE**: The static home page must contain three frames. 2. **LOGIN PAGE** 3. **CATOLOGUE PAGE**: The catalogue page should contain thedetails of all the books available.
2.	Design a web page using CSS which includes the following: i. Use different **font** and **text** styles ii. Set a **background image** for both the page and single element on thepage. iii. Define styles for **links** iv. Working with **layers** v. Adding a Customized **cursor**
3.	a) Develop and demonstrate the usage of **inline**, **internal** and **external**style sheet using CSS. b) Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next in the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).
4.	Write JavaScript to validate the following fields. 1. First Name (Name should contains alphabets and the length shouldnot be less than 6 characters). 2. Password (Password should not be less than 6 characters length).
5.	Write JavaScript to validate the following fields. 1. E-mail id (should not contain any invalid and must follow thestandard pattern name@domain.com) 2. Mobile Number (Phone number should contain 10 digits)

6.	Develop and demonstrate JavaScript with POP-UP boxes and functions for the following problems:
	
	    a) Input: Click on Display Date button using onclick( ) functionOutput: Display date in the textbox.
	    b) Input: A number n obtained using prompt Output: Factorial of nnumber using alert.

7.	Develop and demonstrate JavaScript program for the following:
	
	    a) Input: A number n obtained using prompt Output: A multiplicationtable of numbers from 1 to 10 of n using alert
	    b) Input: A number n obtained using prompt and add another number using confirm Output: Sum of the entire n numbers using alert.

8.	Write an HTML page including any required JavaScript that takes a number from text field in the range of 0 to 999 and shows it in words. It should not accept four and above digits, alphabets and special characters.
9.	Write a program to build a clock using HTML, CSS And JavaScript.
10.	Write a program to design a simple calculator using JavaScript.
11.	Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, and Name of the College, Branch, Year of Joining, and email id. Make up sample data for 3students. Create a CSS style sheet and use it to display the document.
12.	Create a application using Node.JS using MySQL.

AEC – SOFT SKILLS

UNIT 1
Public Speaking
- The power of public speaking
- Developing confidence
- Planning
- Preparation
- Successful and effective delivery of speech

UNIT 2
Group Discussion
- Why are group discussions held?
- Preparation for a group discussion
- Skills for effective participation
- Traits tested in a group discussion
- Initiating a group discussion
- Non-verbal communication in group discussion
- Types of group discussions

UNIT 3
Interview
- Introduction: Interviewing in the 21st century
- Developing an interview strategy
- Types of interviews
- Mock Interviews

UNIT 4
Speech and Accent
- Introduction to phonetics and phonology
- Segmental and supra-segmental features
- 3-dimension chart
- Organs of speech

UNIT 5
Writing Skills
- Introduction to writing and Types of writing; descriptive, narrative, argumentative, expository, and short story
- Writing paragraphs
- Writing a CV