



Lambert

Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University Estd. u/s 3 of UGC Act 1956, Category 'A' by MHRD)
Re-accredited with 'A++' Grade by NAAC. Recognised by UGC Under Section 12B
Coimbatore - 641 043, Tamil Nadu, India

Bachelor's Degree Examination – November 2024

III Semester

Class: II UG
Major: Computer Science

Time: 3 Hours
Max. Marks: 100

23BCSC06 Algorithms

Course Outcomes:

- CO1: Design and analyze programming problem statements.
- CO2: Deploy sorting and search algorithms and analyze their computational complexities.
- CO3: Implement standard operations on graph data structures
- CO4: Analyse the time and space complexities.
- CO5: To analyze Randomized, Distributed, Heuristics algorithms

Part A

10 x 1 = 10

Choose the Correct Answer

1. Which algorithm design technique breaks a problem into smaller subproblems, solves each subproblem, and combines their solutions? CO1 K1
 - a. Greedy Algorithm
 - b. Divide and Conquer
 - c. Dynamic Programming
 - d. Iterative Technique
2. In dynamic programming, what is the technique used to store solutions to subproblems to avoid redundant calculations? CO1 K2
 - a. Backtracking
 - b. Greedy Choice
 - c. Recursion
 - d. Memorization
3. Which sorting technique is particularly efficient for nearly sorted data? CO2 K1
 - a. Merge Sort
 - b. Quick Sort
 - c. Insertion Sort
 - d. Radix Sort
4. Which searching technique checks each element in the list until it finds the target? CO2 K2
 - a. Sequential Search
 - b. Bucket Search
 - c. Binary Search
 - d. Interpolation Search
5. In a graph, which data structure is used by Depth First Search (DFS)? CO3 K1
 - a. Queue
 - b. Stack
 - c. Priority Queue
 - d. Linked List
6. Identify algorithm used to find the Minimum Spanning Tree in a graph? CO3 K2
 - a. Kruskal's Algorithm
 - b. Depth First Search
 - c. Dijkstra's Algorithm
 - d. BFS Algorithm
7. Which of the following is an asymptotic notation used to describe the lower bound of an algorithm's running time? CO4 K1
 - a. $O(n)$
 - b. $o(n)$
 - c. $\Theta(n)$
 - d. $\Omega(n)$
8. Which problem belongs to the class NP-complete? CO4 K2
 - a. Sorting
 - b. Matrix Multiplication
 - c. Travelling Salesman Problem
 - d. Binary Search
9. Which of the following is an example of a randomized algorithm? CO5 K1
 - a. Quick Sort
 - b. Dijkstra's Algorithm
 - c. Prim's Algorithm
 - d. Monte Carlo Algorithm
10. _____ is a common heuristic search technique CO5 K2
 - a. Hill Climbing
 - b. Merge Sort
 - c. Binary Search
 - d. Breadth-First Search

Part B
Answer ALL questions
Each answer should not exceed 400 words or two pages

5 x 6 = 30

- 11.a. Examine the basic design and analysis techniques of algorithms with an example. CO1 K3
(or)
- 11.b. Describe the iterative technique and give an example of where it is used. CO1 K2
- 12.a. Explain the basic working principle of the Bubble Sort algorithm. CO2 K3
(or)
- 12.b. Illustrate the Linear-Time Sorting Algorithm and provide an example. CO2 K4
- 13.a. Classify the Depth First Search (DFS) algorithm and its applications. CO3 K3
(or)
- 13.b. Demonstrate String Processing and manipulates. CO3 K2
- 14.a. Describe what is meant by the 'tight bound' of an algorithm and provide an example. CO4 K2
(or)
- 14.b. Summarize the concept of NP-hard problems with their significance. CO4 K3
- 15.a. Assess the effectiveness of distributed algorithms in large-scale applications by analyzing their performance. CO5 K4
(or)
- 15.b. Explain the concept of heuristic search techniques with an example. CO5 K3

Part C
Answer ALL questions
Each answer should not exceed 800 words or four pages

5 x 12 = 60

- 16.a. Discuss in detail about the divide and conquer techniques. CO1 K6
(or)
- 16.b. Compare and contrast greedy algorithms and dynamic programming with an example. CO1 K5
- 17.a. Determine the working principle of any three Advanced Sorting Techniques with a suitable example. CO2 K6
(or)
- 17.b. Illustrate the difference between Sequential Search and Binary Search in detail. CO2 K5
- 18.a. Outline with a diagram how Depth First Search (DFS) can be used to detect cycles in a directed graph. CO3 K6
(or)
- 18.b. Explain the concept of Minimum Spanning Tree (MST) and describe two different algorithms (Prim's and Kruskal's) for finding MSTs with examples. CO3 K5
- 19.a. Discuss the significance of asymptotic notations (Big-O, Big-Ω, Big-Θ) in the analysis of algorithms. CO4 K6
(or)
- 19.b. Analyze the role of NP-complete problems in the theory of computation and their impact on problem-solving strategies. CO4 K5
- 20.a. Appraise the working of a randomized algorithm in detail with an example. CO5 K6
(or)
- 20.b. Examine a heuristic algorithm for an optimization problem and evaluate its performance. CO5 K4