

Code No. : 7887

Sub. Code : WAIE 12

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2023.

First Semester

Computer Science with Artificial Intelligence

Elective I — DESIGN AND ANALYSIS OF
ALGORITHMS

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (15 × 1 = 15 marks)

Answer ALL questions.

Choose the correct answer :

1. Which data structure allows deleting data elements from and inserting at rear?
 - (a) Stacks
 - (b) Queues
 - (c) Dequeues
 - (d) Binary search tree
2. Which of the following is true?
 - (a) A graph may contain no edges and many vertices
 - (b) A graph may contain many edges and no vertices
 - (c) A graph may contain no edges and no vertices
 - (d) A graph may contain no vertices and many edges
3. The number of edges from the root to the node is called _____ of the tree.
 - (a) Height
 - (b) Depth
 - (c) Length
 - (d) Width
4. Which of the following sorting algorithms is the fastest?
 - (a) Merge sort
 - (b) Quick sort
 - (c) Insertion sort
 - (d) Shell sort
5. Which of the following technique to implement merge sort?
 - (a) Backtracking
 - (b) Greedy algorithm
 - (c) Divide and conquer
 - (d) Dynamic programming
6. What is the worst case time complexity of the Quick sort?
 - (a) $O(n \log n)$
 - (b) $O(n)$
 - (c) $O(n^3)$
 - (d) $O(n^2)$
7. Fractional knapsack problem is solved most efficiently by which of the following algorithm?
 - (a) Divide and conquer
 - (b) Dynamic programming
 - (c) Greedy algorithm
 - (d) Backtracking
8. Which of the following is true?
 - (a) Prim's algorithm initializes with a vertex
 - (b) Prim's algorithm initializes with a edge
 - (c) Prim's algorithm initializes with a vertex which has smallest edge
 - (d) Prim's algorithm initializes with a forest
9. Fractional knapsack problem is also known as
 - (a) 0/1 knapsack problem
 - (b) Continuous knapsack problem
 - (c) Divisible knapsack problem
 - (d) Non continuous knapsack problem
10. Which of the following algorithm is under dynamic programming?
 - (a) Kruskal's algorithm
 - (b) Prim's algorithm
 - (c) Bellman-Ford algorithm
 - (d) Dijkstra's algorithm
11. Consider a complete graph G with 4 vertices. The graph G has _____ spanning trees.
 - (a) 15
 - (b) 8
 - (c) 16
 - (d) 13
12. The travelling salesman problem can be solved using
 - (a) A spanning tree
 - (b) A minimum spanning tree
 - (c) Bellman – Ford algorithm
 - (d) DFS traversal
13. The problem of finding a path in a graph that visits every vertex exactly once is called
 - (a) Hamiltonian path problem
 - (b) Hamiltonian cycle problem
 - (c) Subset sum problem
 - (d) Turnpike reconstruction problem

14. How many unique colors will be required for proper vertex coloring of a line graph having n vertices?
- (a) 0 (b) 1
(c) 2 (d) n
15. How many queens was the extended version of Eight Queen Puzzle applicable for $n * n$ squares?
- (a) 5 (b) 6
(c) 8 (d) n

PART B — ($5 \times 4 = 20$ marks)

Answer ALL questions, choosing either (a) or (b).

16. (a) Discuss about the operations on a stack.
- Or
- (b) Classify graph representation.
17. (a) Examine the control abstraction for divide and conquer algorithm.
- Or
- (b) Describe about quick sort.
18. (a) Illustrate knapsack problem.
- Or
- (b) Determine Huffman codes.

Page 5 Code No. : 7887

19. (a) Analyze single-source shortest paths.
- Or
- (b) Classify the scheme to construct a biconnected graph.
20. (a) Write down the algorithm for least cost search.
- Or
- (b) Write about FIFO branch-and-bound solution.

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions, choosing either (a) or (b).

21. (a) Illustrate binary search trees.
- Or
- (b) Describe about heaps.
22. (a) Examine merge sort.
- Or
- (b) Enumerate to find the maximum and minimum items in a set of n elements.

Page 6 Code No. : 7887

23. (a) Determine Kruskal's algorithm.
- Or
- (b) Explain about single-source shortest paths.
24. (a) Summarize the techniques for binary trees.
- Or
- (b) Analyze breadth first search and traversal.
25. (a) Express graph coloring.
- Or
- (b) Give an overview about Hamiltonian cycles.