

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MSc(SS) DEGREE EXAMINATION DECEMBER 2024
(Fifth Semester)

Branch – SOFTWARE SYSTEMS (Five year Integrated)

DESIGN AND ANALYSIS OF ALGORITHMS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

- 1 The Complexity of Binary Search algorithm is
(i) $O(n)$ (ii) $O(\log n)$
(iii) $O(n^2)$ (iv) $O(n \log n)$
- 2 Why we need a binary tree which is height balanced?
(i) avoid skewing (ii) quick operation
(iii) save memory (iv) simplify access
- 3 Splay trees are preferable for
(i) easy programming (ii) efficient memory
(iii) quick searching (iv) easy program and fast access recent items
- 4 Identify the correct statement in B+ Trees which allows?
(i) Rapid random access (ii) Rapid sequential access
(iii) Both (i) and (ii) (iv) None of these
- 5 The technique followed in Strassens Matrix multiplication is
(i) Greedy method (ii) Divide and Conquer
(iii) Backtracking (iv) Linear search
- 6 The travelling sales man problem can be solved by
(i) spanning tree (ii) Bellman Ford Algorithm
(iii) Minimum spanning tree (iv) DFS traversal
- 7 The problem solved by dynamic programming.
(i) Merge sort (ii) Longest common subsequence
(iii) Binary search (iv) Quick sort
- 8 If the Backtracking reaches complete solution then
(i) Backtrack to root (ii) continue to other possibility
(iii) Traverses from different root (iv) All of these
- 9 Identify which is not a branch and bound to generate branches?
(i) LIFO Branch & Bound (ii) FIFO Branch & Bound
(iii) Lower cost Branch & Bound (iv) Higher Cost Branch & Bound
- 10 The Worst case efficiency of problem solving in polynomial time is
(i) $O(P(n))$ (ii) $O(P(n \log n))$
(iii) $O(P(m \log n))$ (iv) $O(P(n^2))$

SECTION - B (25 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 5 = 25)

- 11 a Solve the following recurrence relation using Master's theorem-
 $T(n) = 3T(n/2) + n^2$.

OR

- b Develop steps need to searching on element in on AVL Tree.

Cont...

- 12 a List out the steps to create a Splay tree.
OR
b Make a note about B+ tree with example.
- 13 a Perform Merge sort using Divide and Conquer method.
OR
b Compute topological sorting using Greedy method.
- 14 a Provide what are steps in dynamic programming solution?
OR
b Illustrate Backtracking method for 4 Queen problem.
- 15 a How to solve 0/1 Knapsack problem in Branch and bound method.
OR
b Discuss about Non deterministic algorithm problems.

SECTION -C (40 Marks)

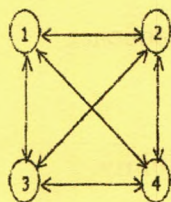
Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 8 = 40)

Question No. 16 is Compulsory

- 16 Summarize analysis of algorithms on simple data structures.
- 17 a Enumerate Potential method of Amortizes analysis.
OR
b Illustrate Indexed sequential access with example.
- 18 a Evaluate Quick sort in the following numbers: 12,98,67,53,22,66,30,20.
OR
b Develop a minimum cost Spanning tree using Prim's algorithm.
- 19 a For the following graph find minimum cost tour for the traveling salesperson problem:



The cost adjacency matrix =

0	10	15	20
5	0	9	10
6	13	0	12
8	8	9	0

- OR
- b Summarize the terminologies used in Backtracking method.
- 20 a Solve the following 0/1 knapsack problem in branch and bound.
Consider the instance: $M = 15$, $n = 4$, $(P_1, P_2, P_3, P_4) = (10, 10, 12, 18)$ and $(w_1, w_2, w_3, w_4) = (2, 4, 6, 9)$.
OR
b Compare the classes of NP-Hard and NP-Complete with diagram.

Z-Z-Z

END