

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION DECEMBER 2024
(Fifth Semester)

Branch – SOFTWARE SYSTEMS (Five years Integrated)

MAJOR ELECTIVE COURSE- I: DESIGN AND ANALYSIS OF ALGORITHMS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 Which of the following best describes space complexity?
(i) The amount of time an algorithm takes to run
(ii) The amount of memory an algorithm requires to execute
(iii) The number of inputs an algorithm can handle
(iv) The number of times an algorithm loops
- 2 What is a splay operation?
(i) moving parent node to down of child (ii) moving a node to root
(iii) moving root to leaf (iv) removing leaf node
- 3 Which of the following algorithms is the best approach for solving Huffman codes?
(i) greedy algorithm (ii) exhaustive search
(iii) divide and conquer algorithm (iv) brute force algorithm
- 4 Which of the following is/are property/properties of a dynamic programming problem?
(i) Optimal substructure
(ii) Overlapping subproblems
(iii) Greedy approach
(iv) Both optimal substructure and overlapping subproblems
- 5 Identify, backtracking can be used to solve
(i) Numerical problems (ii) Exhaustive search
(iii) Combinatorial problems (iv) Graph coloring problems

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a Explain different Characteristics of an Algorithm.
OR
b Explain how rotations work in AVL trees to maintain balance.
- 7 a Illustrate searching in splay trees.
OR
b State the properties of a multiway search tree.
- 8 a Explain an algorithm for Iterative binary search.
OR
b Explain the greedy method and how it works.

Cont...

- 9 a Show the general procedure for dynamic programming.
OR
b What is computational intractability, and how does it relate to NP-hard problems?
- 10 a Explain backtracking general method.
OR
b Discuss the 0/1 Knapsack problem.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a Analyze the recursive algorithm with an example.
OR
b Explain AVL tree insertion.
- 12 a Analyze the amortized time complexity of splay trees, and how is it calculated?
OR
b Elucidate B tree insertion operation.
- 13 a Develop Quick Sort Algorithm and Explain it with example.
OR
b Develop Prim's algorithm to solve minimum cost spanning trees.
- 14 a Elucidate travelling salesman problem using dynamic programming.
OR
b Compare NP-hard and NP-complete problems.
- 15 a Elucidate N-Queens problem using backtracking.
OR
b Create 0/1 Knapsack problem using Branch and Bound method.

Z-Z-Z

END