PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION DECEMBER 2025
(Fifth Semester)

Branch – SOFTWARE SYSTEMS (five years integrated)

MAJOR ELECTIVE COURSE-I: 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)

Module No.	Question No.	Question	K Level	CO
1	1	Which is the average case time complexity of Quick Sort ? (a) $O(n \log n)$ (b) $O(n^2)$ (c) $O(n)$ (d) $O(n^3)$	K1	CO1
	2	What is the height of an AVL tree? (a) $O(n)$ (b) $O(\log n)$ (c) $O(n \log n)$ (d) $O(\sqrt{n})$	K2	CO1
2	3	In splay trees, where does the recently accessed elements are moved to? (a) Leaf (b) Root (c) Left child (d) Right child	K1	CO2
	4	Which of the following application uses B-Trees? (a) Network routing (b) File indexing (c) Compression (d) Sorting	K2	CO2
3	5	Which design technique is used in merge sort? (a) Greedy (b) Divide and Conquer (c) Dynamic (d) Backtracking	K1	CO3
	6	What for the Huffman coding is used? (a) Encryption (b) Data compression (c) Searching (d) Hashing	K2	CO3
4	7	What is the time complexity of Floyd–Warshall algorithm ? (a) $O(n^2)$ (b) $O(n^3)$ (c) $O(n \log n)$ (d) $O(2^n)$	K1	CO4
	8	Which of the following solves longest common subsequence problem ? (a) Backtracking (b) Dynamic Programming (c) Greedy (d) Divide and Conquer	K2	CO4
5	9	Which algorithm solves the N-Queens problem ? (a) Backtracking (b) DP (c) Greedy (d) Branch and Bound	K1	CO5
	10	What type of problem does the 0/1 Knapsack with Branch and Bound belong to? (a) Optimization problem (b) Sorting problem (c) Graph problem (d) Search problem	K2	CO5

SECTION - B (35 Marks)
Answer ALL questions
ALL questions carry EQUAL Marks   (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the Master's Theorem with example.	K2	CO4
		(OR)		
	11.b.	Interpret the recurrence relation for merge sort.		

	12.a.	How would you apply B-Trees to organize data efficiently?		
2		(OR)	K3	CO4
	12.b.	How would you implement deletion in B* Trees.		
3	13.a.	Build the Merge Sort algorithm and its time complexity.	K3	CO3
		(OR)		
	13.b.	Organize and explain the steps of Huffman Coding.		
4	14.a.	Inspect the recursive formula for LCS problem.	K4	CO5
		(OR)		
	14.b.	Analyze the All-Pairs Shortest Path problem with example.		
5	15.a.	Analyze the algorithm for N-Queens problem.	K4	CO5
		(OR)		
	15.b.	Examine the bounding and state-space tree in detail.		

SECTION -C (30 Marks)
Answer ANY THREE questions
ALL questions carry EQUAL Marks   (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Analyze searching, insertion, and deletion in AVL trees.	K4	CO4
2	17	Examine the multiway search trees with example.	K4	CO4
3	18	Analyze the Minimum Cost Spanning Tree and Huffman coding with examples.	K4	CO3
4	19	Inspect the Travelling Salesman Problem using Dynamic Programming.	K4	CO5
5	20	Examine the Graph Coloring in backtracking.	K4	CO5

Z-Z-Z   END