

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086
(For candidates admitted from the academic year 2023 – 2024 & thereafter)

M.Sc. DEGREE EXAMINATION, APRIL 2026
INFORMATION TECHNOLOGY
SECOND SEMESTER

COURSE : CORE

PAPER : DESIGN AND ANALYSIS OF ALGORITHMS

SUBJECT CODE : 23CS/PC/AA24

TIME : 3 HOURS

MAX. MARKS: 100

Q. No.	SECTION A Answer all the questions (10 x 2=20)	CO	KL
1.	Identify the basic data structures used to store linear data.	CO1	K1
2.	Define Amortization.	CO1	K1
3.	Define brute force technique.	CO1	K1
4.	List the algorithms that are based on divide and conquer method.	CO1	K1
5.	Mention any two applications of dynamic programming.	CO1	K1
6.	Differentiate between Warshall's and Floyd's algorithms.	CO2	K2
7.	Interpret the concept of minimum spanning tree.	CO2	K2
8.	Review the limitation of the Greedy method.	CO2	K2
9.	Summarize the challenges associated with NP-Complete problems.	CO2	K2
10.	Describe the objective of the Bin Packing algorithm.	CO2	K2
Q. No.	SECTION B Answer all the questions (4 x 5=20)	CO	KL
11.	a) Apply the stack operations to demonstrate how elements are inserted into and removed from a stack. Illustrate your answer with an example. (OR) b) Given a queue initially empty, insert the elements 10, 20, 30 and then remove one element. Show the state of the queue after each operation.	CO3	K3
12.	a) Trace the execution of Bubble Sort for the array: 8, 3, 5, 2 Show the array after each iteration. (OR) b) Demonstrate the working of Binary Search algorithm on a sorted dataset using a suitable example.	CO3	K3

13.	a) Show how shortest paths are computed between all node pairs using Floyd’s algorithm. (OR) b)Simulate the steps of Warshall’s algorithm to identify all possible paths between vertices.	CO3	K3																									
14.	a)Summarize the role of greedy approaches in optimization problems. (OR) b)Compare the problem-solving approach of backtracking and branch and bound techniques.	CO4	K4																									
Q. No.	SECTION C Answer all the questions (6 x 10=60)	CO	KL																									
15.	a)Examine the efficiency of an algorithm using asymptotic notation. (OR) b)Illustrate the non linear data structures tree and graph based on their operations and applications.	CO3	K3																									
16.	a)Given n items of known weights $w_1, w_2, \dots, w_n$ and values $v_1, v_2, \dots, v_n$ and a knapsack of capacity W, find the most valuable subset of the items that fit into the knapsack. (OR) b)Explain Merge sort algorithm with a suitable example.	CO4	K4																									
17.	a) Interpret how the Optimal Binary Search Tree method minimizes the average search time and explain its advantage. (OR) b) Analyse the Travelling Salesman problem with the help of dynamic programming.	CO4	K4																									
18.	a)Evaluate the algorithm for finding the Minimum cost SpanningTree using Kruskal's method. (OR) b)Validate the working principle of Dijkstra’s algorithm in the greedy approach.	CO5	K5																									
19.	a)Assess the space and time complexity of backtracking when applied to the n-Queens Problem. (OR) b) Evaluate P and NP problems and explain their relationship in solving computational problems.	CO5	K5																									
20.	a)Find the solution for the following Assignment problem <table><tr><td></td><td>Job 1</td><td>Job 2</td><td>Job 3</td><td>Job 4</td></tr><tr><td>Person 1</td><td>9</td><td>2</td><td>7</td><td>8</td></tr><tr><td>Person 2</td><td>6</td><td>4</td><td>3</td><td>7</td></tr><tr><td>Person 3</td><td>5</td><td>8</td><td>1</td><td>8</td></tr><tr><td>Person 4</td><td>7</td><td>6</td><td>9</td><td>4</td></tr></table> (OR) b)Formulate the Quick Sort algorithm and demonstrate its working step by step.		Job 1	Job 2	Job 3	Job 4	Person 1	9	2	7	8	Person 2	6	4	3	7	Person 3	5	8	1	8	Person 4	7	6	9	4	CO5	K6
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