STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086
(For candidates admitted from the academic year 2025- 2026)

B.C.A. DEGREE EXAMINATION APRIL 2026
SECOND SEMESTER

COURSE : CORE
PAPER : ALGORITHMS AND DATA STRUCTURES
SUBJECT CODE: 25CS/MC/AD25
TIME : 3 HOURS **MAX. MARKS: 100**

SECTION - A

Answer ALL of the following **(5 x 2 = 10)**

Q.No.		CO	CL
1.	What is a Data structure? Give an example	CO1	K1
2.	What is Garbage collection?	CO1	K1
3.	What are the properties that any recursive procedure must follow?	CO1	K1
4.	Define a binary tree.	CO1	K1
5.	What is a weighted graph?	CO1	K1

SECTION - B

Answer any FOUR of the following **(4 x 5 = 20)**

Q.No.		CO	CL
6.	Demonstrate the working of linear search.	CO2	K2
7.	Explain and illustrate a circular linked list with a diagram.	CO2	K2
8.	Explain the PUSH operation of a stack using an array.	CO2	K2
9.	Explain how searching and inserting happens in a Binary Search Tree.	CO2	K2
10.	Discuss adjacency matrix and path matrix in graphs.	CO2	K2

SECTION - C

Answer any THREE of the following **(3 x 10 = 30)**

Q.No.		CO	CL
11.	Apply the bubble sort algorithm and sort the following list: 32, 52,27,85,23. Explain the working of the algorithm.	CO3	K3
12.	Make use of a singly linked list and explain the traversal operation.	CO3	K3
13.	Identify the steps to solve the insert operation in a Queue using a linked list.	CO3	K3

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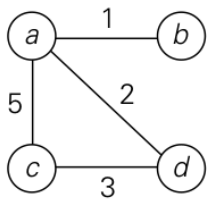
14.	Construct a binary tree for the arithmetic expression: [a+(b-c)] * [(d-e)/(f+g-h)]. Use preorder and post order tree traversal, provide the prefix, and postfix notation for the expression given.	CO3	K3
15.	What is the minimum spanning tree? Construct the minimum spanning tree for the graph given below using Prim's algorithm.  	CO3	K3

SECTION - D

Answer any FOUR of the following **(4 x 5 = 20)**

Q.No.		CO	CL
16.	Analyse Best, Average, Worst cases for an algorithm with an appropriate example.	CO4	K4
17.	Distinguish a singly linked list from a doubly linked list.	CO4	K4
18.	What are the applications of a queue? Analyse how the FIFO property of a queue ensures fairness in these applications.	CO4	K4
19.	Explain the working of the Binary search algorithm. Analyse its time complexity.	CO4	K4
20.	Discuss the working of merge sort algorithm with an example.	CO4	K4

SECTION - E

Answer any TWO of the following **(2 x 10 = 20)**

Q.No.		CO	CL
21.	Evaluate the Dijikstra's shortest path algorithm.	CO5	K5
22.	Evaluate the arithmetic expression written in postfix notation using a stack: 5, 6, 2, +, *, 12, 4, /, -	CO5	K5
23.	What is a heap? Examine the operations of a Heap.	CO5	K5

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