Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – October 2025

Date: 28-10-2025 **Time:** 11.00am to 12.30pm

School: SOIS-PG	**Program:** MCA	
Course Code : CSA4201	**Course Name:** Data Structures and Algorithms	
Semester: I	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**24**	**26**	**-**	**-**	**-**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2 marks. **5Q x 2M=10M**

1	What is a priority queue? Give one example of where it can be used.	**2 Marks**	**L1**	**CO1**
2	In Dijkstra's algorithm, what is the purpose of maintaining a "distance" array?	**2 Marks**	**L1**	**CO1**
3	Define a hash function. Give one simple example.	**2 Marks**	**L1**	**CO2**
4	What is a dictionary in data structures?	**2 Marks**	**L1**	**CO2**
5	What is hashing and what is its main purpose?	**2 Marks**	**L1**	**CO2**

Part B

Answer the Questions. **Total Marks 40M**

6.	**a.**	A browser maintains the history of visited web pages using a stack. The user visits pages in the order: Google → YouTube → Gmail → ChatGPT. • Show the stack contents after visiting all pages. • If the user presses the "Back" button twice, what pages are visited and what remains in the stack? • Write an algorithm for push and pop operation	**10 Marks**	**L2**	**CO1**

		Or			
7.	**a.**	Explain the difference between simple queue, circular queue, Double ended queue and priority queue with diagrams.	**10 Marks**	**L2**	**CO1**

8.	**a.**	A company wants to connect its 5 offices (A, B, C, D, E) with minimum cost network. The weighted edges (cost in) are: • A-B: 2, A-C: 4, B-C: 1, B-D: 7, C-D: 3, D-E: 1, C-E: 5 • Draw the graph. • **Use Prim's algorithm to find the Minimum Spanning Tree (MST).** • Write Prim's algorithm	**10 Marks**	**L2**	**CO1**
		Or			
9.	**a.**	A city has 6 locations (1 to 6) connected as follows (distances in km): • 1-2: 4, 1-3: 2, 2-3: 1, 2-4: 5, 3-4: 8, 3-5: 10, 4-6: 2, 5-6: 3 • Draw the graph • Use Dijkstra's algorithm to find the shortest distance from location 1 to all other locations. • Show step-by-step updates of the distance table. • Identify the shortest path from 1 to 6.	**10 Marks**	**L2**	**CO1**

10.	**a.**	A hash table uses linear probing with size 8. Insert keys: 8, 16, 24,32,40. Hash function: h(k) = k mod 8. • Show the table after all insertions. • Explain the difference between linear and quadratic probing under open addressing.	**10 Marks**	**L3**	**CO2**
		Or			
11.	**a.**	A hash table of size 10 uses quadratic probing. Hash function h(k) = k mod 10. Insert keys: 5, 15, 25,35,45 • Show the table after insertions. • Explain how quadratic probing resolves collisions.	**10 Marks**	**L3**	**CO2**

12.	**a.**	**Explain separate chaining with a simple example.**	**10 Marks**	**L2**	**CO2**
		Or			

13.	**a.**	Describe the difference between primary clustering and secondary clustering in open addressing.	**10 Marks**	**L2**	**CO2**