Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India

(Autonomous College Affiliated to University of Mumbai)

ESE

December- 2023

Max. Marks: 100 | Duration: 3.00 hrs

Class: F.Y. MCA | Semester: I

Course Code:MC501 | Branch: M.C.A.

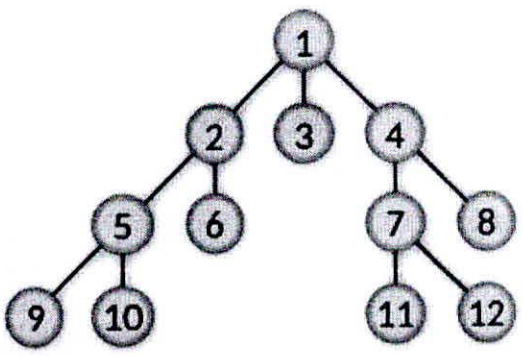
Name of the Course: Data structures

Instruction:

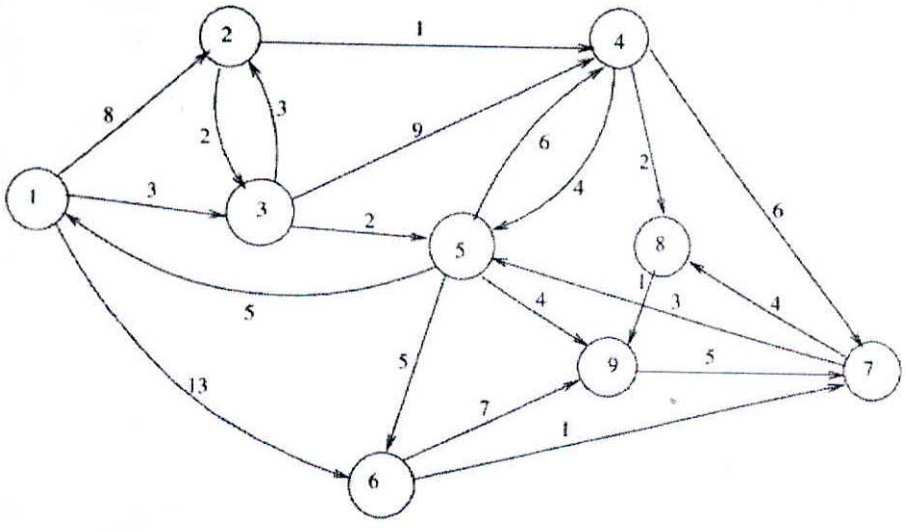
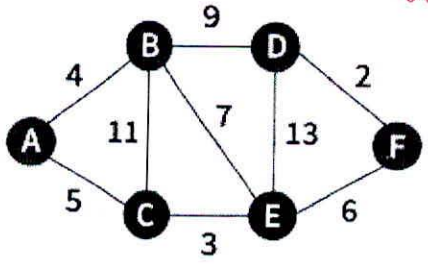
(1) All questions are compulsory

(2) Draw neat diagrams

(3) Assume suitable data if necessary

Q. No.	Questions	Max. Marks	CO-BL
Q1 A)	Write the algorithm to Convert the infix expression into postfix. What are the postfix and prefix forms of the expression? A+B*(C-D)/(P-R). **OR** What is the usage of stack in recursive algorithm implementation? Write an algorithm to find factorial using stack (without recursion)	10	1-3
B)	What are the merits and demerits of Linked List over Arrays Write an algorithm to insert an element in the linked list. (The insertion is in sorted linked list of numbers.)	10	1-3
C)	Explain circular queue and implement it covering all operations defined on circular queue.	8	1-3
Q2 A)	Explain the breadth first search and depth first search methods. List down the situations where BFS is efficient. List down the situations where DFS is efficient. Apply BFS and DFS traversal on following tree and display the nodes.  	10	2-3
B)	Name the different ways of representing a graph. Use one of the ways to represent the following graph. What data structure is used to represent the	8	2-3

201,
207 309

	graph?  		
C)	Write **Dijkstra's Algorithm for** Single Source Shortest Path. Apply Single Source Shortest Path Algorithm on following graph and find the path between source(A) and destination(B)  	**10**	**2-3**
Q3 A)	Differentiate between Sequential search, Binary search and Interpolation Search. Write the algorithms and analyze the complexity.	**10**	**3-3** **3-4**
B)	Write the algorithm for Bubble sort, analyze it to find the complexity. Apply the algorithm on following data, show all the iterations. 1, 100, 3, 60,20,80, 5,30,17	**10**	**3-4** **3-3**
C)	What is the need for hashing? What are the collision resolution methods? What is Rehashing? Explain any two hashing techniques.	**8**	**3-2**
Q 4A)	Write an algorithm to sort Singly linked list using Quick Sort method. Find the complexity of your algorithm OR Write an algorithm to simulate Queue using Heap. Find the complexity of your algorithm	**10**	**4-4**
B)	Explain the concept 'Towers of Hanoi'. How to solve this problem? What data structure can be used to solve it?	**6**	**Self study**