SVKM'S NMIMS

MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT& ENGINEERING

Academic Year: 2023-2024

Program: Master of Computer Applications (MCA) Year: I Semester: I

Subject: Data Structures and Algorithms Time: 3 Hrs. (10:00am to 1:00pm)

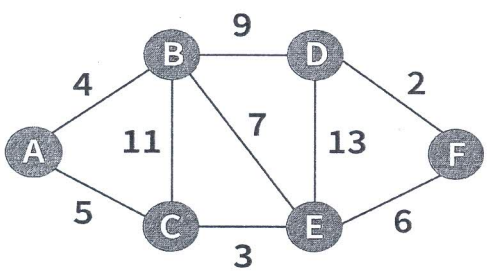
Date: 7 / 2 / 2024 No. of Pages: 02

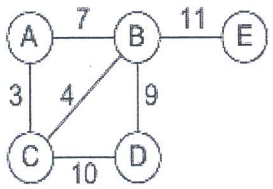
Marks: 100

Re-Examination

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

1) Question No. _1_ is compulsory.
2) Out of remaining questions, attempt any _4_ questions.
3) **In all _5_ questions to be attempted.**
4) All questions carry equal marks.
5) **Answer to each new question to be started on a fresh page.**
6) **Figures in brackets on the right hand side indicate full marks.**
7) **Assume Suitable data if necessary.**

Q1		Answer briefly:	
CO-1; BL- L	a.	Discuss different types of data structures with suitable example.	[05]
CO-1; BL-L	b.	Explain different types of loops used in calculation of the time complexity of an algorithm.	[05]
CO-2; BL-M	c.	What do you mean by dynamic data structures? Give suitable example.	[05]
CO-4; BL- M	d.	Write and explain the algorithm for linear search using an array.	[05]
Q2 CO-2; BL-M	a.	Discuss the working of In-order, Pre-order and Post-order binary tree traversal algorithms with suitable example.	[10]
CO-2; BL-M	b.	Write and explain algorithms to perform Insert and Delete operation from the linked list as a last node.	[10]
Q3 CO-3; BL-L	a.	Apply Dijkstra's algorithm for a given Graph and find out the shortest distance from node A to every other node, mentioning all the steps. Also, find out the shortest path from A to F from the distance matrix. 	[10]
CO-3; BL-H	b.	What is recursion? Write suitable recursive function to find the factorial of N. Discuss the use of stack in recursion.	[10]

Q4 CO-3; BL-H	a.	Explain hashing with suitable example. Discuss the significance of linear probing used in hashing.	[10]
CO-4; BL-L	b.	Discuss the use of stack data structure in converting following Infixed expression to Postfixed expression. Write all the necessary steps used in conversion. A / B + (C – (D + 5)) – E * F	[10]
Q5 CO-2; BL-L	a.	What are the advantages of circular queue over linear queue? Write suitable algorithm to insert and delete element from the circular queue.	[10]
CO-3; BL-M	b.	Implement Kruskal's algorithm on following graph to find out the minimum spanning tree. Show all the steps and use of data structures.  	[10]
Q6 CO-3; BL-H	a.	Perform insert operation for the given sequence: 22, 38, 56, 66, 78, 80, 85, 87, 94, 98 and generate Binary Search Tree. Discuss time complexity and disadvantages with respect to generated tree.	[10]
CO-2; BL-M	b.	Explain the Insertion sort algorithm with a suitable example. Perform best, average, and worst-case complexity analysis on the same.	[10]
Q7 CO-3; BL-H	a.	Explain the working principles of DFS and BFS with suitable example.	[10]
CO-4; BL-L	b.	Discuss suitable application of stack where linked list implementation is necessary. Perform push and pop operations with suitable algorithms.	[10]