SVKM'S NMIMS

MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT ENGINEERING / SCHOOL OF TECHNOLOGY MANAGEMENT ENGINEERING

Program: MCA Year: I Semester : I

AcademicYear: 2022-2023

Subject: Data Structures and Algorithms

Date : 20 February 2023

Marks: 100

Time: 11.00 am - 02.00 pm

Durations: 3 (Hrs)

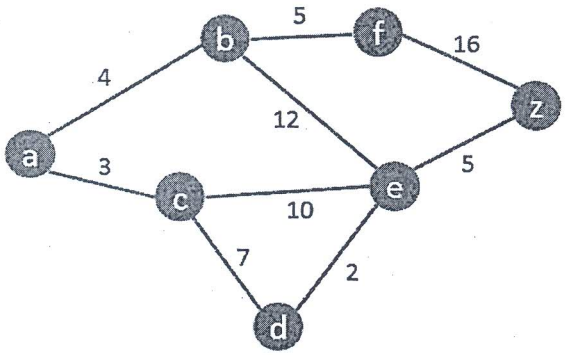
No. of Pages: 02

Re-Examination (2022-23)

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-M	a.	How do you judge the performance of algorithms? Explain with suitable example.	[05]
CO-2 ; BL-L	b.	Discuss any two applications of stack data structure.	[05]
CO- 2; BL- M	c.	How do you create node and represent linked list in the memory? Show the memory representation for at least two insert operations with required pointers.	[05]
CO-3 ; BL- L	d.	Discuss the advantages and disadvantages of Adjacency list over Adjacency matrix.	[05]
Q2 CO-2; BL-M	a.	Discuss with suitable scenario the significance of circular queue. Write all the necessary conditions to perform insert and delete operations with an example.	[10]
Q2 CO-2; BL-H	b.	How does a node be represent for doubly linked list? Perform and explain following operations with suitable algorithms on doubly linked list. 1. Insert at the start and last location. 2. Delete the element from a specified location other than first and last locations.	[10]
Q3 CO-3; BL-H	a.	Draw a binary searched tree (BST) for the following data. Identify and discuss possible delete operations with the help of suitable algorithms. 50, 30, 65, 12, 38, 60, 70, 68.	[10]
Q3 CO-2; BL-L	b.	Discuss and explain a stack representation using singly linked list with push and pop operations.	[10]

Q4 CO-2; BL-H	a.	Explain a scenario (preferably a factorial function) where recursion is preferred over looping. Discuss the use of stack in recursion and draw recursion tree for the same.	[10]
Q4 CO-3; BL-M	b.	What are different ways to traverse the binary tree? Discuss and display various output sequences of traversal with suitable example.	[10]
Q5 CO-1; BL-L	a.	Discuss application of binary tree data structure with the help of suitable example.	[10]
Q5 CO-3; BL-H	b.	What is single source shortest path problem? Apply Dijkstra's algorithm with all the steps to find out solution for following graph with starting node a. Give its time complexity. 	[10]
Q6 CO-4; BL-M	a.	Differentiate between binary search and linear search algorithms. Discuss and apply binary search for successful and unsuccessful search. Give its time complexity. 20, 23, 35, 46, 57, 68, 77, 80, 98.	[10]
Q6 CO-4; BL-M	b.	Apply and explain selection sort algorithm on the following dataset to sort them in ascending order. 23, 45, 12, 67, 22, 15, 78, 56, 34, 49. Also discuss worst case time complexity of the same.	[10]
Q7 CO-1; BL-L	a.	Explain Breadth First Search traversal algorithms with suitable example. Discuss its time complexity analysis.	[10]
Q7 CO-4; BL-H	b.	Write a short not on selection sort.	[05]
Q7 CO- 1; BL- L	c.	Discuss the importance of data structures with its classification.	[05]