31/7/23

Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri(West),Mumbai 400058-India
(An Autonomous Institute Affiliated to University of Mumbai

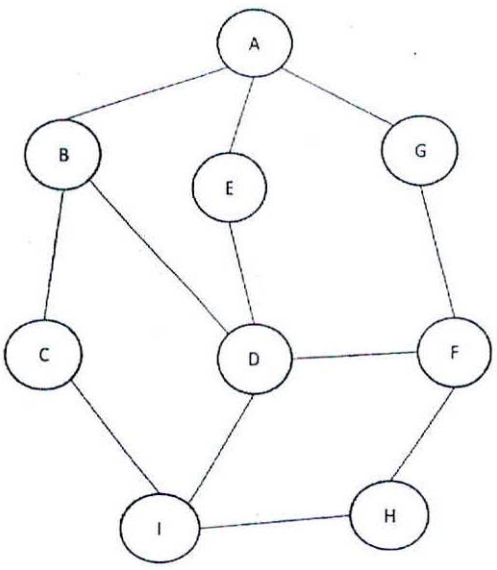
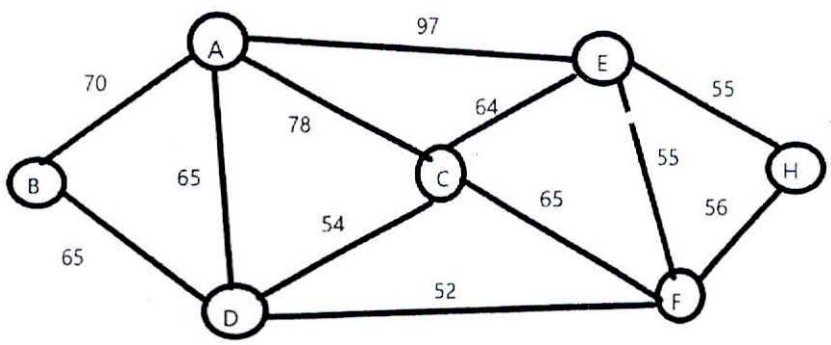
Special Examination

Max. Marks: 100
Class: FYMCA
Course Code:MC501
Course: Data Structures

Duration: 3 Hrs
Semester: I
Date: 8/8/23
Time: 10 to 1

Instructions:
(1) All Questions are Compulsory.
(2) Draw neat diagrams.
(3) Assume suitable data if necessary.

No	Question	Max. Marks	CO	BL
Q1 A	Apply stack operations to evaluate following postfix expression. Construct an algorithm for the same. 13, 3, + , 14, 15, *, 3, +, +	8	1	3
Q1 B	Apply Binary Search to find key 120 from following data. Write an algorithm for the same. 12, 120, 45, 35, 100, 88, 67, 45, 34, 78	7	3	3
Q1 C	Apply Master's theorem to calculate the worst case time complexity of the given relation. $T(n) = 2\ T(n/2) + n^2$	5	4	3
Q2 A	Use Modulo Division hashing technique along with Linear Probing collision resolution technique to calculate the address of following set of elements. Consider the number of memory locations are 677 Elements : 89822, 78787, 78865, 89998, 6767, 12, 1002, 898980	8	3	3
Q2 B	Illustrate Graph Storage Representation with the help of an example.	7	2	2
Q2 C	Illustrate how Johnson's algorithm is implemented using Queue with the help of an example.	5	1	3
Q3 A	Compare worst case complexity of Insertion and Selection Sort with the help of an example.	10	4	4
Q3 B	Build B Tree of order 5 of following data and identify which properties of B tree are satisfied? N G A H E K Q M F W L T Z **OR** Build Max Heap Tree for the following data and construct an algorithm for building Max Heap. 10, 20, 30, 45, 67, 5, 3, 1, 12, 6	10	2	3
Q4 A	Compare Quick Sort and Radix Sort in terms of number of passes and iterations required to sort following data 10, 45, 67, -8, 7, -18, 78, -90	10	4	4

Q4 B	Construct a Push and Pop operation algorithm for implementing 3 stacks using single array.	10	1	3
Q5 A	Apply Depth First Search Algorithm on following Graph and identify the sequence. Construct an algorithm for the same.  	10	2	3
Q5 B	Apply following operations on Circular Queue of size 5 and identify the front, rear and Queue values. (Note. E= Enqueue and D=Dequeue. You need to show all the steps.) E(10), E(20), E(30), D, D, E(40), E(50), D, D, E(60) **OR** Illustrate how Sparse Matrix is implemented using Linked List with the help of an example.	5	1	3
Q5 C	Apply Dijkstra's Shortest Path algorithm to calculate the shortest distance from the source B To the destination H. (Note: Show all the steps)  	5	2	3