Sardar Patel Institute of Technology

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

End Semester Examination

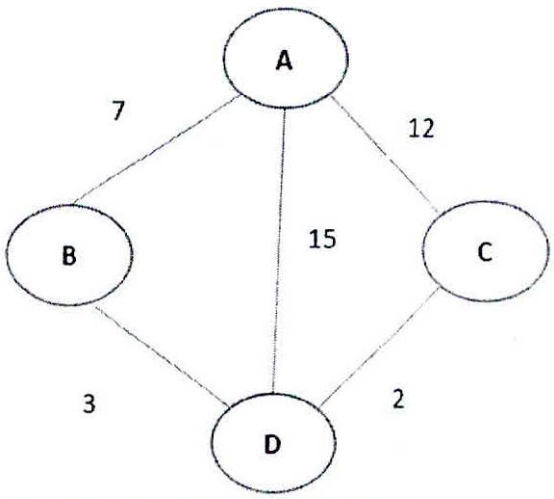
Max. Marks: 100
Class: FYMCA
Course Code:MC501
Course: Data Structures

Duration: 3 Hrs
Semester: I
Date: 8/3/23
Time: 2 to 5

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 convert following infix expression into postfix expression. Construct an algorithm for the same. (A+B)*C+(D*F)/G	8	1	3
Q1 B	Apply Interpolation 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. $T(n) = 2\,T(n/2) + n$	5	4	3
Q2 A	Build Binary Search Tree for the following data 10, 20, 2, 45, 67, 8, 5, 7, 100, 16 Construct a non recursive algorithm for preorder traversal.	8	2	3
Q2 B	Use Fold shifting hashing technique along with Quadratic probing collision resolution technique to calculate the address of following set of elements. Consider the number of memory locations are 1080 Elements : 12346, 18987, 99981, 78781, 868688, 8989898, 45654	7	3	3
Q2 C	Illustrate the data structure used to keep web browser history with the help of an example.	5	1	3
Q3 A	Compare worst case complexity of Bubble and Selection Sort with the help of an example.	10	4	4
Q3 B	Build Huffman Tree for the following data. **OR** 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	10	3	3

Char.	A	B	C	D	E	F	G	H	I	J
Freq.	100	24	43	21	45	22	18	56	78	34

Q4 A	Compare Shell Sort and Insertion 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 an algorithm for Polynomial Addition using Linked List with suitable example.	10	1	3
Q5 A	Build AVL Tree for the following data and construct an algorithm for RR rotation.. 10, 20, 30, 45, 67, 4, 7, 10	10	2	3
Q5 B	A queue is setup in a circular array A[0…n-1] with front and rear defined as usual. Assume that n-1 locations in the array are available for storing the elements. Give a formula for the number of elements in the queue in terms of rear, front and n. **OR** Illustrate how Sparse Matrix is implemented using Linked List with the help of an example.	5	1	3
Q5 C	Apply Floyd Warshall's algorithm on following Graph to identify the shortest path. 	5	2	3