Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 07

B.Sc. (AI&ML) (Sem.–2)

DATA STRUCTURES

Subject Code : UGCA1915

M.Code : 79858

Date of Examination : 17-12-2022

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. Write briefly :

a) Using linear probing to resolve collision when applying the hash function (key %10) to the following keys: 11, 115, 175, 181, 165, 132, 220, 119, 256, 123. What will be the order of the storage of entries?

b) Prim's spanning tree algorithm uses stack as a data structure. Comment.

c) How many number of swapping needed to sort the given sequence 3, 2, 1 in ascending order using Heap sort? Explain.

d) Convert the expression A*B+C/D-F to equivalent Prefix and Postfix notations.

e) Which is the most efficient search technique used in an ordered array? Explain.

f) With respect to a binary search tree, explain how to delete a node having two children?

g) Explain Linear Probing and Quadratic Probing using a suitable example.

h) Analyze the time complexity of push and pop in a heap.

i) Give the analysis of Depth First Search using adjacency lists.

j) What is a 'Priority Queue' and write its Applications?

SECTION-B

2. a) Write an algorithm of selection sort.

   b) Explain the technique used in quick sort using an unsorted list of elements.

3. a) Given the following arithmetic expression in postfix notation as 623 + -382/+*23 + evaluate it. Show the contents of stack and output at each stage.

   b) Suppose you have a queue of certain capacity. Write an algorithm to double the size of the queue. What is the time complexity of the method adopted?

4. a) A binary tree has 9 nodes. Draw the tree where inorder and preorder traversals of the tree yields the following sequence of nodes: Inorder – E A C K F H D B G, Preorder : F A E K C D H G B.

   b) For a given array with n symbols how many stack permutations are possible?

5. What is spanning tree? Explain Kruskal's algorithm to find the minimal spanning tree, with a suitable example.

6. **Define the following :**

   a) Binary tree.

   b) Complete binary tree

   c) Almost complete binary tree

   d) Binary search tree

   e) Depth of a tree.

7. Write the properties of singly linked list :

   a) Write an algorithm to print elements of a single linked list in a reverse order.

   b) Give an algorithm to insert a node at a specified position for a given singly linked list.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.