

DA-125

December-2017

2nd Year M.Sc. (CA & IT), (Integrated)

Data Structures

Time : 3 Hours]

[Max. Marks : 100

1. Answer the following : 20

- (1) Define the following :
 - (a) Sparse matrix with example
 - (b) Priority queue.
- (2) Convert the given infix expression into postfix expression : $((A+B)*D)^{(E-F)}$
- (3) Write an algorithm for PUSH and POP operations in stack.
- (4) Evaluate the following postfix expression :
 - (a) $5,6,*,4,3,-,7,+,-$
 - (b) $2,10,3,+,*,5,2,*, -, 3,2, ^, +$

2. Answer the following : 20

- (1) Consider a circular queue where Queue is allocated 6 memory cells. Initially the Queue is empty. Perform the following operations and display value of Front and Rear pointers after each operation.
Front = 2
Rear = 4
Queue : _,P,Q,R,_,_
 - (a) Insert S
 - (b) Insert T
 - (c) Delete 2 characters
 - (d) Insert X, Y
 - (e) Delete a character.
- (2) Write an algorithm to insert a new node after the given node in a single linked list.
- (3) Write an algorithm to delete a given node from doubly linked list.
- (4) Write an algorithm to insert a new node at a given location in circular linked list.

3. Answer the following : 10
- (1) Create a Binary Search Tree (BST) for the given following elements :
Find all the 3 traversals using recursive method.
55,33,11,22,44,99,88,77,66,110,150,90
 - (2) Write an algorithm to delete a node from Binary Search Tree (BST) having zero or one child. 4
 - (3) Define the following with example : (Any 3) 6
 - (a) AVL Tree
 - (b) Similar Binary Tree
 - (c) Copy of a binary tree
 - (d) Terminal node
4. Answer the following : 10
- (1) Define the following in terms of graph with example : (Any 5) 10
 - (a) Degree of a node
 - (b) Cycle
 - (c) Complete graph
 - (d) Weighted graph
 - (e) Multigraph
 - (f) Directed graph
 - (2) Find adjacency and path matrix for the following directed graph : 5
- ```

graph TD
 V1((V1)) --> V2((V2))
 V2 --> V1
 V1 --> V3((V3))
 V2 --> V4((V4))
 V3 --> V4
 V4 --> V3

```
- (3) Attempt any **one** : 5
    - (a) Write an algorithm to implement Depth First Search.
    - (b) Write an algorithm to implement Breadth First Search.
5. Answer the following :
- (1) Write an algorithm for Insertion sort. 5
  - (2) Sort the following numbers using Radix sort : 5  
45823,83110,11225,34602,50075
- OR**
- Write an algorithm for Binary search.
- (3) Sort the following numbers using Quick sort : 10  
5,55,15,25,95,75,45,65,35,85