

Course Code : 2101CS301

Date : 10-10-2022

Course Name : Data Structure

Duration : 150 Minutes

Total Marks : 70

Instructions:

1. Attempt all the questions.
2. Figures to the right indicates maximum marks.
3. Make suitable assumptions wherever necessary.

Q.1 (A) Define Data Structure, write down the classification of data structure and differentiate between linear and nonlinear data structures. **4**

(B) Solve the Postfix Expression $6\ 2\ 3\ +\ -\ 3\ 8\ 2\ /\ +\ * \ 2\ \$\ 3\ +$ using Stack. **3**

OR

Consider the stack S of characters, where S is allocated 8 memory cells.

S: A,C,D, F, K, _ , _ , _

Sketch the stack after each of the following operations.

Pop(), Pop() ,Push(L), Push(P), Pop(), Push(R), Push (S), Pop()

(C) Write an algorithm to convert an infix expression to postfix expression. **7**

OR

Write an algorithm for inserting an element in a stack, removing an element from stack.

Q.2 (A) Illustrate the working of priority queue with suitable example. **4**

(B) Given a linked list whose typical node consists of an INFO and LINK field. Write an algorithm which will count the number of nodes in the list. **3**

OR

Write an algorithm for insertion of node at last position in Liner Linked List.

(C) Write an algorithm for inserting and deleting an element in circular queue. **7**

OR

What is the need of doubly linked list? Consider a problem of inserting a node into a doubly linked linear list to the left of a specified node whose address is given by variable M. Write the details of algorithm.

Q.3 (A) Differentiate: BFS and DFS. **4**

(B) Given Inorder and Preorder traversal, compute Postorder traversal. **3**
Inorder: Y B K C F A G X E D H Z
Preorder: G B Y A C K F X D E Z H

OR

Prepare BST for following sequence and find inorder traversal for the same.

35, 46, 29, 2, 24 ,68, 44, 57, 1, 22, 79, 71

- (C) Prepare B-tree of order 5 from the following sequence: 7
C N G A H E K Q M F W L T Z D P R X Y S

OR

Prepare an AVL tree for the following sequence of numbers. Also mention name of action taken.

200, 400, 800, 900, 850, 700, 950, 100, 150

- Q.4** (A) What is hashing? What are the qualities of a good hash function? Explain any two hash functions in detail. 4
- (B) Prepare the hash table of size 10. Using quadratic probing, insert the keys 72, 27, 36, 24, 63, 81, and 101 into hash table. 3

OR

Prepare a chained hash table of 10 memory locations. Insert the keys 131, 3, 4, 21, 61, 24, 7, 97, 8, 9 in hash table using chaining. Use $h(k) = k \bmod m$. ($m=10$)

- (C) State and explain collision resolution techniques in hashing. 7

OR

What is file organization? Briefly summarize different file organizations.

- Q.5** (A) Write an algorithm for insertion sort. 4
- (B) Apply merge sort algorithm to the following elements: 3
20, 10, 5, 15, 25, 30, 50, 35

OR

Apply Bubble sort algorithm to the following elements:
11, 15, 13, 14, 2, 8, 10

- (C) Apply Quick sort algorithm to the following elements: 7
29 15 11 82 22 17 53 57 4 8

OR

Apply binary search technique to Search the number 50 from the given data. Illustrate the searching process.

10, 14, 20, 39, 41, 45, 49, 50, 60
