2021-24

Time : 3 hours

Full Marks : 60

Pass Marks : 24

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer from both the Groups as directed.

Group – A

(Compulsory)

1. Choose the correct answer of the following : 1×10 = 10

   (a) Among the following options, which of the following type of data structure is used in recursion ?

   (i) Queues type of data structure

   (ii) Array type of data structures

   (iii) List type of data structures

   (iv) Stack type of data structures

(b) Which among the following matrix has lots of elements as zero ?

(i) Unit matrix type

(ii) Identity matrix type

(iii) Zero matrix type

(iv) Sparse matrix type

(c) What maximum difference in heights between the leafs of a AVL tree is possible ?

(i) Log(n) where n is the number of nodes

(ii) n where n is the number of nodes

(iii) 0 or 1

✓(iv) Atmost 1

(d) What are the worst case and average case complexities of a binary search tree ?

(i) O(n), O(n)

(ii) O(log n), O(log n)

(iii) O(log n), O(n)

(iv) O(n), O(log n)

(e) Which of the following is non-linear data structure ?

(i) Stack (ii) Tree

(iii) Linked List (iv) None of these

(f) Maximum number of nodes in a binary tree with height k, where root is height 0, is :

(i) 2^{k-1} (ii) 2^{k+1-1}

(iii) 2^{k-1+1} (iv) 2^{k-1}

(g) Which of the following algorithm does not divide the list ?

(i) Linear search

(ii) Binary search

(iii) Merge sort ✓

(iv) Quick sort

(h) Which of the following data structure can't store the non-homogeneous data element ?

(i) Arrays (ii) Records

(iii) Pointers (iv) Stacks

(i) Which data structure is used in BFS of a graph to hold nodes ?

(i) Stack ✓ (ii) Queue

(iii) Tree (iv) Array

(j) A directed graph is _____ if there is a path from each vertex to every other vertex in the digraph :

(i) Weakly connected

(ii) Strongly connected

(iii) Tightly connected

(iv) Linearly connected

2. Convert the following infix expression to postfix using stack.

A+(B*C+D) / E 5

Group – B

3. Answer any **three** questions of the following : 15×3 = 45

(a) Write an algorithm for binary search and linear search.

(b) What is AVL tree ? Construct AVL tree for the following data and mention the type of rotation for each case.

50, 25,1 0, 5, 7, 3, 30, 20, 8, 15

(c) Write an algorithm for insertion sort. Sort the following elements using insertion sort.

12 4 3 1 15 45 33 21 10 2

(d) What do you mean by stack and its applications ? Write an algorithm for PUSH and POP operation in stack.

(e) Explain the following terms :

(i) Threaded Binary Tree

(ii) Hash Table

(iii) Priority Queue