2022

COMPUTER SCIENCE — GENERAL

Paper : GE/CC-2

(Algorithm and Data Structure)

Full Marks : 50

The figures in the margin indicate full marks.

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

Answer **Question no. 1** and **any four** questions from the rest.

1. Answer **any five** questions from the following :　　　　　　　　　2×5

   (a) Differentiate between Linear and Non-Linear data structure.

   (b) Define a Binary Search Tree.

   (c) What are the advantages of Linked List over Array?

   (d) What is the postfix expression of the given infix expression (A + B) / (X − Y) * C?

   (e) Differentiate between Linear Queue and Circular Queue.

   (f) What are the advantages of Binary Search over Linear Search?

   (g) What do you understand by column major representation of a two-dimensional array?

   (h) What do you understand by leaf nodes and internal nodes in a tree?

2. (a) Write an algorithm to insert an element at the beginning and end of singly linked list.

   (b) What are the characteristics of an algorithm?　　　　　　　　　(4+3)+3

3. (a) Define stack.

   (b) Write algorithms for the following stack operations, for array implementation of stack :

   　(i) Test whether the stack is empty.

   　(ii) Test whether the stack is full.

   　(iii) Push an element to the stack.

   　(iv) Pop an element from the stack.
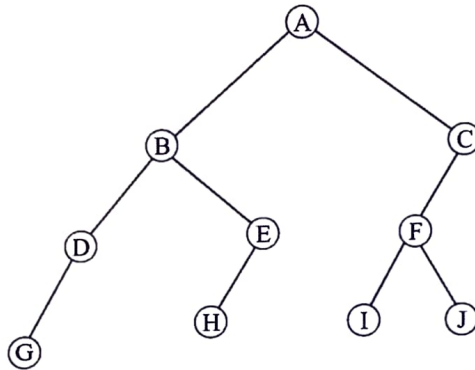
   　(v) Peek the stack.　　　　　　　　　2+(1+1+2+2+2)

4. (a) Evaluate the following postfix expression using stack :

8, 2, 3, +, −, 9, 3, /, *.

4+6

(b) Write algorithm for merge sort.

5. (a) Perform pre-order, in-order and post-order traversal of the following binary tree.

(b) Write an algorithm to search an element from an array using binary search.   (2+2+2)+4

6. (a) Define BST.

(b) Construct a BST using the following nodes –

50, 30, 80, 100, 20, 70, 40, 90, 10, 60

Show all the steps in your construction.

(c) What do you observe when you perform in-order traversal of a BST? Does this apply to the BST above?   2+5+(1+2)

7. (a) Suppose a 2D-array A is declared using A (2:8, 1:4). How many elements can you store in A? What will be the location of A [5] [6] if you store the elements using row-major order (consider w = 4)?

(b) Write an algorithm for Insertion sort.   (2+3)+5

8. (a) "Binary Search is not possible in linked list" — Justify.

(b) What are the advantages of doubly linked list over singly linked list?

(c) Write an algorithm to implement delete at end operation on doubly linked list.   3+3+4

————————