2021

COMPUTER SCIENCE — GENERAL

Paper : GE/CC-2

(Algorithms 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** from the rest.

1. Answer **any five** questions from the following: 2×5
   (a) Define ADT.
   (b) Name two linear and two non-linear data structures.
   (c) What are the advantages of linked list over array?
   (d) Consider the array A[4][4] of type integer (w = 4). The base address of A is 2000. Find the address of the element at position A[2][3] in column-major order.
   (e) Differentiate between stack and queue.
   (f) What are the prefix and postfix expressions of the infix expression: a – b/ c + d
   (g) Differentiate between internal sort and external sort.
   (h) Define a binary tree.

2. (a) Write an algorithm to delete a node from the end of a singly linked list.
   (b) Write an algorithm to merge two sorted array into a third array. 5+5

3. (a) Evaluate the following postfix expression using stack: 7, 5, 3, 2, ^, *, 9, 2, 2, ^ – / + 6, 4 * +
   (b) Write an algorithm to implement insert and delete operations on a queue. 4+(3+3)

4. (a) Why is partitioning operation important in quicksort? Explain with an example.
   (b) How can push() operation on a stack be implemented using linked list? Write an appropriate algorithm.
   (2+4)+(1+3)

5. (a) Write an algorithm to search an element from an array of n elements using linear search method.
   (b) Write an algorithm to search an element from a circular linked list. 5+5

6. (a) Write an algorithm to sort an array of integers using selection sort technique. Can this algorithm be used to sort words (strings)? If so, then what modifications need to be done?
   (b) In order to multiply two-dimensional arrays which condition must be satisfied? (6+2)+2

Please Turn Over

7.　(a)　Write an algorithm to sort an array of integers using insertion sort technique.

　　(b)　Differentiate between full binary tree and complete binary tree with proper examples.　　　　6+4

8.　(a)　Define binary search tree. Build a binary search tree with the following elements:

　　　　20, 15, 18, 25, 56, 49. Clearly show all the steps.

　　(b)　Perform pre-order and post-order traversals on this binary search tree. Show their traversal sequence .

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