2023

DATA STRUCTURE AND ALGORITHMS

Paper : BCA–2·1

Full Marks : 80

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : ***(any five)*** 1×5=5

   (a) Define Abstract Data Type(ADT)s.

   (b) Give an example of LIFO data structure.

   (c) Reverse polish notation is also known as _____. *(Fill in the blank)*

   (d) Best case complexity of Quick Sort algorithm is _____. *(Fill in the blank)*

   (e) Height of a complete binary tree having *n*-roots is _____. *(Fill in the blank)*

   (f) Give *one* use of Queue data structure.

2. Answer the following questions : ***(any five)*** 5×5=25

(a) What do you mean by row-major and column-major ordering? Explain with example.

(b) What is linked list? What are different types?

(c) What is stack underflow? Explain with example.

(d) Give a recursive algorithm to perform in-order traversal of binary search trees.

(e) Give a function/algorithm to count the number of nodes in a singly linked list.

(f) How array and linked lists are different? Explain.

3. Answer ***any four*** from the following : 4×5=20

(a) Convert the following infix notation to postfix notation—

$$a + b*c/d + (e-f)/g$$

(b) Write functions/algorithms to perform enqueue and dequeue in Queue data structure.

(c) Write an algorithm/function to perform binary search algorithm.

(d) Compare best case and worst case time complexity of binary search and linear search algorithms.

(e) What is complexity analysis? What are different types of complexity analysis? Explain *any one.*

(f) Define algorithms. What are the characters of good algorithms?

(g) Explain optimal binary search tree.

4. Answer ***any three*** from the following : 10×3=30

(a) Write algorithms to implement BFS *or* DFS.

(b) Write a program to implement Stack data structure.

(c) Write a program to implement Binary Search tree data structure (give methods to –create, insert, treverse.)

(d) Perform merge sort on the following data— (show all the steps)
21, 1, 26, 45, 29. 28.

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