WEST BENGAL STATE UNIVERSITY

B.A./B.Sc. Honours 2nd Semester Examination, 2021

CMAACOR03T-COMPUTER APPLICATION (CC3)

DATA STRUCTURE

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

Answer Question Number 1 and any *four* from the rest

1. Answer any ***four*** questions from the following: 2×4 = 8

   (a) Define stack as a data structure.

   (b) Why tree is called a non-linear data structure?

   (c) What is ADT?

   (d) Evaluate the following Postfix expression 7 3 4 + - 2 4 5 / + * 6 / 7 +

   (e) How overflow can be detected in a circular queue while inserting a new element?

   (f) List advantage of linked list over arrays.

2. (a) Write an algorithm / pseudocode to add a new node at the middle of a doubly linked list. 6+2

   (b) How many pointer movements are required to perform the above task?

3. (a) What is a Complete binary tree? Construct a binary tree given the pre-order traversal and inorder traversal as follows: 4+2+2

   Pre-Order Traversal: G B Q A C K F P D E R H

   In-Order Traversal: Q B K C F A G P E D H R

   (b) Show that the maximum number of nodes in a binary tree of height h is $2^{h+1} - 1$.

   (c) Give a suitable linked representation of sparse matrix in computer so that memory space might be efficiently utilized.

4. (a) An array contains the elements shown below. Using the Binary search algorithm, trace the steps followed to find the key 88. Show the contents of list after each iteration. What is the number of comparisons required? 4+2+2

   13, 17, 18, 26, 44, 56, 88, 97, 100.

   (b) What are the advantages of the postfix form of an expression over the infix and the prefix?

5. (a) Explain quick sort algorithm with the help of an example. 3+5

   (b) With a suitable example, explain how polynomials are added using linked lists.

6. (a) Trace the steps of insertion sort algorithm to sort the following elements: 6+2

   12, 25, 5, 9, 1, 84, 63, 7, 15, 4.

   (b) What are the difference between recursion and iteration?

7. (a) Develop a binary search tree resulting after inserting the following integer keys 6+2

   49, 27, 12, 11, 33, 77, 26, 56, 23, 6.

   (i) Check whether the tree is almost complete or not.

   (ii) Determine the height of the tree.

   (iii) Write postorder and preorder traversals.

   (b) Write the pseudo code to implement transpose of a matrix.

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

——×——