No. of Printed Pages—2

396 (DS)

[20-HKPGDEO–M2S(O)21J]

MScIT/PGDCA/MCA 2nd Semester (Old) Exam., 2020

DATA STRUCTURE THROUGH C LANGUAGE

[MScIT/PGDCA/MCA (S2) 06]

Full Marks : 50

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. Answer the following questions as directed : 1×8=8

(a) Define data structure.

(b) Differentiate between an array and a linked list.

(c) Define space complexity.

(d) Quick sort considers a portioning element called _____ that divides a list into two sub-lists. (Fill up the blank)

(e) What is external sorting?

(f) Complexity of binary search algorithm is _____. (Fill up the blank)

(g) Give a real-life example of stack.

(h) Name two operations of a stack.

2. Answer the following questions : 2×7=14

(a) Define stack. How does a stack differ from a queue?

(b) Write the two rules followed while implementing a priority queue.

(c) Define a complete binary tree with an example.

(d) Differentiate between strongly and weakly connected graphs with examples.

(e) Write the advantages of a circular linked list over a singly linked list.

(f) What is the formula to compute the address of any element of a 2-D array stored in column-major order?

(g) Mention three traversal methods in a binary tree.

3. Answer any *three* of the following questions : 6×3=18

   (a) Describe the insertion sort algorithm. Sort the following items using insertion sort : 2+4=6

   45 21 6 10 2 35 12

   (b) Define recursive function. Write a program in C to check whether a given string is a palindrome or not with the help of a stack. 1+5=6

   (c) Define a binary search tree. Draw a BST using the following two traversals : 1+5=6

In-order traversal :	30	35	40	50	66	75	90	110	125
Pre-order traversal :	66	40	30	35	50	90	75	110	125

   (d) Write the structure of a node of doubly linked list. Also give the algorithms for creating a node of doubly linked list and insertion in the beginning of a doubly linked list. 2+4=6

4. Answer any *one* of the following questions : 10

   (a) Write a program in C to search an element in an array using binary search method.

   (b) Describe how graphs can be represented using adjacency matrix representation and adjacency lists representation. 5+5=10

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