

C1021

Total Pages : 4

Roll No.

MCS-405/DCA-105

Data Structures & Program Methodology

(MSCIT/PGDCA/DCA)

2nd Semester Examination, 2022 (June)

Time : 2 Hours]

Max. Marks : 80

Note : This paper is of Eighty (80) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION–A

(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Twenty (20) marks each. Learners are required to answer any Two (02) questions only.
(2×20=40)

1. Answer the following :

- (a) Given an array of n integers, write an algorithm to find the smallest element. Find number of instruction executed by your algorithm. What are the time and space complexities? (10)

- (b) Define shortest path problem. (5)
- (c) Define minimum cost spanning tree. (5)

2. Answer the following: (5 marks each)

- (a) What is the maximum depth of a heap with n elements?
- (b) What is AVL Tree?
- (c) How can we determine the balance factor?
- (d.) What are the differences between a linked list and an array?

3. Answer the following :

- (a) What is Direct Addressing? When is it used? (7)
- (b) What is the advantage of using Hash Function over Direct Addressing? Explain. (7)
- (c) When does a 'collision' occur? What are the methods to resolve it? Explain giving examples. (6)

4. Answer the following: (10 marks each)

- (a) Explain Königsberg Bridge Problem.
- (b) Write and explain the prim's algorithm and depth first search algorithm.

5. Answer the following: (4 marks each)

- (a) Define non-linear data structure.
- (b) Define tree.

- (c) What is meant by directed tree?
- (d) What is a ordered tree?
- (e) What is traversing? What are the different types of traversing?

SECTION-B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Ten (10) marks each. Learners are required to answer any Four (04) questions only. (4×10=40)

1. Answer the following :
 - (a) What are the advantages and disadvantages of linked list?
 - (b) Explain in detail about separate chaining.
2. Explain the steps involved in insertion and deletion into a singly and doubly linked list.
3. Answer the following :
 - (a) Distinguish between stack and queue.
 - (b) What is a circular linked list?
4. Explain Dijkstra's algorithm with an example.
5. Write the algorithm for quick sort.

6. Design a heap sort algorithm to sort in non-ascending order.
 7. Describe the time complexity of inserting an element into a complete heap in terms of N , the number of elements in the heap, and in terms of H , the height of the tree.
 8. How can you represent a Binary Tree in memory using array.
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