A–831

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MCS-405/DCA-105/MIT (CS)-401

(MSCIT/DCA/MSCCS)

(Data Structures and Program Methodology/Data Structure)

2nd/4th Semester Examination, 2024 (June)

Time : 2:00 Hrs. Max. Marks : 70

Note* :–** This paper is of Seventy (70) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given therein. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

Section–A

(Long Answer Type Questions) 2×19=38

***Note* :–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. Describe algorithm and properties of algorithm. How is the complexity of an algorithm calculated ? Write an algorithm to display the Fibonacci series.

2. Write the difference between a stack and a queue. Convert the following infix expression to postfix expression :

$$(a–(b + c)*d) \wedge (e + f)$$

3. Define Singly Link List. Explain the steps with example the traversal and searching in singly link list.

4. What is binary search tree ? Construct a binary search tree from the following elements and traverse the tree using postorder traversal method :

51 82 92 35 95 6 18 59 42

5. Write down quick sort algorithm and radix sort algorithm. Illustrate the working of quick sort and radix sort to sort the following list :

25, 15, 30, 9, 99, 20, 26, 80, 42

Section–B

(Short Answer Type Questions) 4×8=32

***Note* :–** Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. Write down the best, worst and average case time complexity of linear search.

2. What is minimum spanning tree ? Explain with a suitable example of your own choice.

3. Explain the working of heap sort. What is the maximum depth of a heap with n elements ?

4. Discuss B-Tree with the examples of Searching, Insertion and Deletion operations.

5. What are the different hashing techniques ? Explain the 'division method' for creating hash functions.

6. What is Königsberg bridge problem ? How can we solve the Konigsberg bridge problem ?

7. Discuss program development life cycle. Discuss in brief the phases of PDLC.

8. What is AVL tree ? What is a balance factor in AVL trees ?

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