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MCS-405/DCA-105

Data Structure and Program Methodology

(MSCIT/PGDCA/DCA)

2nd Semester Examination, 2023 (June)

Time : 2 Hours] **[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 answer to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

SECTION–A

(Long Answer Type Questions)

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.

(2×19=38)

1. Discuss the following in detail : (Marks are mentioned against each question)

(a) Discuss the algorithms for the following procedures in linked list with examples of each? (3×4=12 Marks)

(i) Creating and inserting nodes at starting, at the end, and at middle in a singly linked list.

(ii) Creating and inserting nodes at starting, at the end, and at middle in a doubly linked list.

(iii) Deleting nodes at starting, at the end, and at middle in a singly linked list.

(iv) Deleting nodes at starting, at the end, and at middle in a doubly linked list.

(b) Discuss algorithm for addition and deletion of items in a Queue. (7 Marks)

2. Discuss the following sorting strategies in detail with algorithm and examples of each: (Marks are mentioned against each question)

(a) Bubble Sort (5 Marks)

(b) Selection Sort (5 Marks)

(c) Merge Sort (5 Marks)

(d) Sink Sort (4 Marks)

3. Discuss the following in detail: (Marks are mentioned against each question)

(a) Discuss Binary Tree Traversal alongwith Inorder, Preorder and Postorder Traversal with examples of each. (9 marks)

(b. Discuss the following in detail: (Marks are mentioned against each question) : (10 marks)

(i) Queue. (3 Marks)

ii) Tree. (3.5 Marks)

iii) Graph. (3.5 Marks)

4. Discuss the following in detail along with the examples and diagrams of each: (4.75 Marks each, 4.75 × 4 = 19)

(a) Representation of AVL Tree

(b) Determination of Balance Factor

(c) Insertion of a node in AVL Tree

(d) Deletion of a node in AVL Tree

5. Discuss the following in detail along with the examples and diagrams of each: (4.75 Marks each, 4.75 × 4 = 19)

(a) Heapification.

(b) Building Heap.

(c) Heap Sort.

(d) Priority Queue in Heap.

SECTION–B

(Short Answer Type Questions)

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. (4×8=32)

1. Write a procedure to count the number of the time the word 'the' appears in a given text.

2. Explain the 'division method' for creating hash functions.

3. Discuss Radix Sort with algorithm, example and time-complexity.

4. Write a program that sorts the elements of a two dimensional array :

(a) Row wise.

(b) Column wise.

5. Write a procedure for the merge procedure Merge 1 (a, i, j, k). Explain taking example.

6. Disucuss Hashing and the methods of Dealing with Hash Clash.

7. Discuss B-Tree with the examples of Searching, Insertion and Deletion operations, also give examples of these operations.

8. Discuss Algorithm of Binary Search with examples, complexity, limitations and padding.
