Reg. No. : 9 1 0 0 2 3 6 2 2 0 4 6

Question Paper Code : 60835

M.C.A. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

First Semester

MC 4101 – ADVANCED DATA STRUCTURES AND ALGORITHMS

(Regulations 2021)

Time : Three hours
Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish Average and worst-case analysis of algorithm with an example.

2. Write Importance of efficient algorithms.

3. List out the Properties of Red-Black Trees.

4. Draw the structure of Fibonacci Heap.

5. Find Depth-First Search traversal for the following graph.
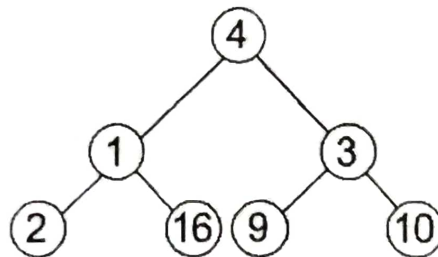
6. Write the Floyd-Warshall Algorithm.

7. Specify the elements of Dynamic Programming.

8. Mention the benefits of using Huffman Code.

9. Can NP-complete problems be reduced to NP -hard problems in polynomial time?

10. Identify some proofs of the NP completeness for any suitable problem.

PART B — (5 × 13 = 65 marks)

11. (a) Summarize various Asymptotic notations to calculate the time complexity of an algorithm. Also Mention the Complexity level of each notation.

Or

(b) Identify an suitable algorithm for Towers of Hanoi problem (Disc size 3) using recursion. Discuss.

12. (a) List out the Properties of B-Tree and explain all Basic operations on B-Trees in detail.

Or

(b) Describe all heap operations with neat diagram and suitable examples.

13. (a) Write down the Breadth-First Search algorithm and Show the BFS traversal with an example.

Or

(b) Determine the minimum spanning tree for the given weighted graph using Kruskal algorithm :
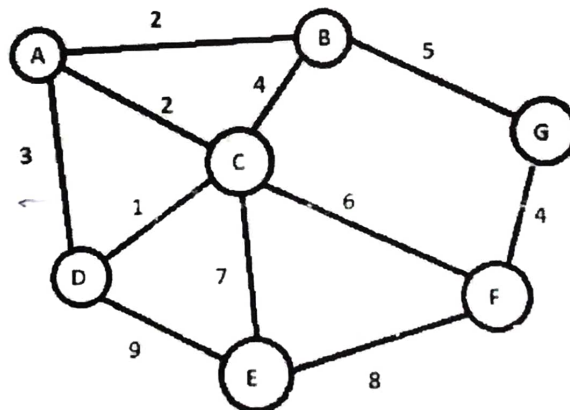
14. (a) Define Dynamic Programming. Determine the lowest cost way using Matrix Chain Multiplication with suitable example.

Or

(b) Write short notes on :

    (i)   Characteristics of Greedy strategy   (3)

    (ii) Applications of Greedy Algorithms   (3)

    (iii) Elements of Greedy Algorithms   (3)

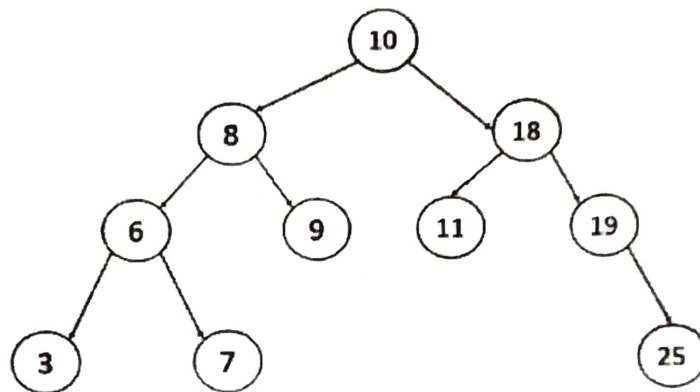   (iv) Activity selection Problem.   (4)

15. (a) (i) Summarize NP completeness Concept with example. (7)

(ii) Distinguish NP hard problems and NP completeness problems. (6)

Or

(b) How does the NP-Completeness concept is involved in travelling salesman problem to find shortest path.

PART C — (1 × 15 = 15 marks)

16. (a) Elaborate the steps to insert 15 and to delete 6 from the given Binary Search Tree.

Or

(b) Demonstrate the step by step calculation of the minimum spanning tree starting from node A using Dijkstra's Algorithm. Also calculate the final cost of the tree.

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