Reg. No. : 8 1 0 0 2 2 6 2 2 0 0 4

Question Paper Code : 30139

M.C.A. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

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. What is the necessity of algorithm analysis?
2. What is time complexity and its types?
3. How do you identify a red-black tree?
4. What is a heap used for?
5. What are the different ways to represent graphs in memory?
6. Is Floyd-Warshall better than Dijkstra in which way?
7. What is the main idea of dynamic programming?
8. Is dynamic programming better than greedy algorithm design technique justify?
9. Are all NP problems NP-complete? Explain.
10. List out any four NP-complete problems.

PART B — (5 × 13 = 65 marks)

11. (a) Explain Asymptotic notations and list out common notations with an example. (13)

Or

(b) Explain Recursion Tree Method with an example. (13)

12. (a) Define B tree and explain the inserting and deletion operation of B tree with pseudocode and example. (13)

Or

(b) Explain Heap data structure and also explain about min heap and max heap with one example of heap construction. (13)

13. (a) Difference between BFS and DFS graph traversal algorithms. Consider a tree of minimum height of 4, and do BFS and DFS traversals. (13)

Or

(b) What is MST? Explain few major differences between prim and kruskal MST. (13)

14. (a) Explain matrix chain multiplication algorithm with an example. (13)

Or

(b) Explain with an example of Huffman coding technique. List few applications of Huffman coding. (13)

15. (a) Explain NP-complete problem with an example. (13)

Or

(b) Define P, NP, NP-Hard, NP-Complete and explain relations among these. (13)

PART C — (1 × 15 = 15 marks)

16. (a) What strategy is followed in Divide and Conquer way of algorithm design and explain quick sort algorithms in detail with an example? (15)

Or

(b) Define AVL tree and how to determine the balance factor. Explain all rotations in detail with appropriate examples. (15)