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Total No. of Printed Pages: 1

Total No. of Questions: [11]

MCA (Semester – 2nd)
DATA STRUCTURES
Subject Code: MCAPS1201
Paper ID: [20270106]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It carries 16 marks. It consists of 4 questions of 4 marks each.
2. Section B consist of 4 questions of 8 marks each. The student has to attempt any 3 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(4 marks each)

- Q1. Explain the time-space tradeoff in data structures and provide an example where this tradeoff is significant.
- Q2. Define a binary search tree? Given the following sequence of numbers, draw the binary search tree that would result from inserting them in this order: 50, 30, 70, 20, 40, 60, 80.
- Q3. Describe the concepts of Adjacency matrix, and Adjacency lists.
- Q4. How hashing works? Discuss one potential issue that may occur when hashing is implemented.

Section – B

(8 marks each)

- Q5. Give one example each of Infix, postfix and prefix expressions. Describe evaluation of postfix expression using the stack data structure?
- Q6. Draw a tree and label its Root Node, Leaf Node, Level, Degree, and Height? How a tree is stored using an array?
- Q7. Write Dijkstra's algorithm for shortest distance calculation. Demonstrate the algorithm with an example graph to solve the travelling salesman problem?
- Q8. Compare efficiency of linear and binary search algorithms.

Section – C

(10 marks each)

- Q9. Describe the Depth First Traversal (DFS) algorithm in detail. Provide an example, showing step-by-step traversal. Discuss a practical application and how the traversal method supports the application.
- Q10. Describe the Quick Sort algorithm and explain its working with the help of an example. Why it is considered an efficient sorting algorithm for large datasets.
- Q11. Explain the concept of algorithmic complexity and Big-O notation. Analyze the time complexity of an algorithm that includes nested loops?