THIRD SEMESTER UG DEGREE EXAMINATION, NOVEMBER 2025

(FYUGP)

CC24UCSC3CJ202 - DATA STRUCTURES AND ALGORITHM

(B.Sc. Computer Science - Major Course)

(2024 Admission - Regular)

Time: 2.0 Hours   Maximum: 70 Marks

Credit: 4

Part A (Short answer questions)

Answer *all* questions. Each question carries 3 marks.

1. Explain the differences between a data type and a data structure with suitable examples.   [Level:2] [CO1]

2. Explain the diffderences between one-dimensional and two-dimensional arrays with examples.   [Level:2] [CO1]

3. Demonstrate a circular queue. How is it different from a linear queue?   [Level:3] [CO2]

4. Execute the basic operations performed on a stack with example?   [Level:3] [CO2]

5. Execute one advantage and one disadvantage of using non-recursive traversal compared to recursive traversal.   [Level:3] [CO3]

6. Execute with an example how deletion of a leaf node is performed in a binary tree?   [Level:3] [CO3]

7. Execute the structure of a node in a binary tree using linked list.Sequence the advantages of representing a binary tree using linked list over array.   [Level:3] [CO3]

8. Describe what does "in-place" mean in sorting, and how does it contrast with the space usage of Merge sort?   [Level:2] [CO4]

9. Discuss the comparison between the linear search and binary search alogorithms.   [Level:2] [CO4]

10. Discuss the challenges of external sorting.   [Level:2] [CO4]

(Ceiling: 24 Marks)

Part B (Paragraph questions/Problem)

Answer *all* questions. Each question carries 6 marks.

11. Explain with algorithms how you would insert and delete a node from a singly linked list. Also, describe the process to display the list using traversal.   [Level:2] [CO1]

12. Interpret the structure of a singly linked list and a doubly linked list with key concepts [Level:2] [CO1]

13. Implement with algorithm and conditions how insertion and deletion operations are performed in a stack using array. Provide suitable example to demonstrate overflow and underflow. [Level:3] [CO2]

14. Make a comparison on simple graph, multigraph, and weighted graph with examples. [Level:3] [CO3]

15. Execute the applications of adjacency matrix representation and adjacency list representation in graph-related problems. Provide at least two examples. [Level:3] [CO3]

16. Make a note on how to obtain prefix, infix, and postfix expressions from an expression tree. [Level:3] [CO3]

17. Describe the Multiplication Method of Hashing. Show how a key is converted into a hash address step by step. [Level:2] [CO4]

18. Explain the Selection Sort algorithm with suitable example [Level:2] [CO4]

(Ceiling: 36 Marks)

Part C (Essay questions)

Answer any *one* question. The question carries 10 marks.

19. Demonstrate any two basic operations of a queue and explain any two real-life applications of queues. [Level:3] [CO2]

20. Explain Linear Probing in Closed Hashing with an algorithm and example. Discuss its advantages and the problem of primary clustering. [Level:2] [CO4]

(1 × 10 = 10 Marks)

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