24U327

Name : ....

Reg. No : ....

THIRD SEMESTER UG DEGREE EXAMINATION, NOVEMBER 2025

(FYUGP)

CC24UBCA3CJ201 - DATA STRUCTURES AND ALGORITHMS

(Computer Application - 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.	Summarize the key features of a doubly linked list. How does it differ from a singly linked list?	[Level:2] [CO1]
3.	Demonstrate the steps to perform the pop operation from a stack implemented using a singly linked list.	[Level:3] [CO2]
4.	Use the concept of a stack and how does it follow the LIFO principle? Give a real-life example.	[Level:3] [CO2]
5.	Apply the concept on adjacency list with an example. Provide one advantage and one disadvantage of adjacency list representation.	[Level:3] [CO3]
6.	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]
7.	Demonstrate with the help of a graph for a company network has 4 computers connected with the following costs (in units):as a weighted undirected graph and list its vertex set and edge set. A–B = 2, B–C = 3, C–D = 4, A–D = 5.	[Level:3] [CO3]
8.	Discuss the basic idea of the Multiplication Method in Hashing.	[Level:2] [CO4]
9.	Identify the best-case scenario for the Bubble Sort algorithm. State its time complexity in this scenario.	[Level:2] [CO4]
10.	Differentiate between Open Hashing and Closed Hashing.	[Level:2] [CO4]

(Ceiling: 24 Marks)

Part B (Paragraph questions/Problem)

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

11. Explain with the help of an algorithm, how to insert an element at a specific position in a one-dimensional array.Illustrate the process with an example.   [Level:2] [CO1]

12. 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]

13. Demonstrate the working of a linear queue and mention conditions for overflow and underflow.   [Level:3] [CO2]

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

15. Demonstrate the working of non-recursive postorder traversal using two stacks. Illustrate with an example binary tree.   [Level:3] [CO3]

16. Draw a binary tree with at least 7 nodes. Perform insertion of a new node and deletion of a node (with two children), showing before and after diagrams.   [Level:3] [CO3]

17. Describe the binary search algorithm.   [Level:2] [CO4]

18. Explain the two broad classifications of sorting algorithms based on the location of the data during the sorting process.   [Level:2] [CO4]

(Ceiling: 36 Marks)

Part C (Essay questions)

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

19. Implement a queue using Array in detail. a. Structure definition b. Algorithm for enqueue c. Algorithm for dequeue.   [Level:3] [CO2]

20. Describe the comparative study of Merge Sort and Quick Sort.   [Level:2] [CO4]

(1 × 10 = 10 Marks)

****