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Question Paper Code: 93802

B.E./B.Tech. DEGREE EXAMINATION, NOV 2025

Third Semester

Information technology

19UIT302 - Data Structures and Algorithms

(Regulation 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. In how many ways can you categorize data structures? And Explain CO1- U
2. How array is represented in memory? CO1- U
3. Consider the queue given below five Persons Already in Queue which has FRONT = 1 and REAR = 5. CO2- App

	A	B	C	D	E				
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Show the queue after each operation of the following sequence

- i. Enqueue(F)
 - ii. Dequeue
 - iii. Dequeue
 - iv. Enqueue(G)
 - v. Enqueue(H)
 - vi. Dequeue
4. How stacks are used in a non-recursive program? CO3- Ana
 5. Which is the best data structure to implement AVL Tree? Array or Linked List. Justify. CO3- Ana
 6. How AVL is performing better than binary search tree? CO3- Ana
 7. Write some applications of graph. CO1- U
 8. Define in-degree and out-degree of a graph. CO1- U
 9. How does selection sort work? CO1- U
 10. Mention the different ways to select a pivot element. CO1- U

PART – B (5 x 16= 80 Marks)

11. (a) Apply the concept of singly linked list to perform insertions and deletions in all cases CO2- App (16)

Or

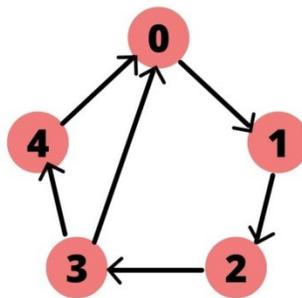
- (b) Apply the concept of circular linked list to perform insertions and deletions in all cases CO2- App (16)
12. (a) Write a program to perform Push and Pop operations on a stack array CO2- App (16)

Or

- (b) A circular queue has a size of 5 and has 3 elements 10,20 and 40 where $F=2$ and $R=4$. After inserting 50 and 60, what is the value of F and R . Trying to insert 30 at this stage what happens? Delete 2 elements from the queue and insert 70, 80 & 90. Show the sequence of steps with necessary diagrams with the value of F & R . CO2- App (16)
13. (a) Write an algorithm to create, insert and delete nodes in binary tree. CO2- App (16)

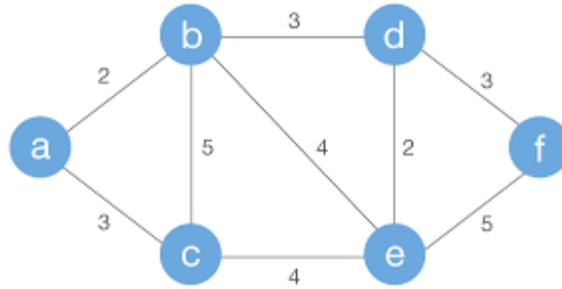
Or

- (b) For the given data, draw a binary search tree and show the array and linked representation of the same: 100,85,45,55,110,20,70,65. CO2- App (16)
14. (a) Define graph. For the given graph, show the adjacency matrix and adjacency list representation of the graph. CO2-App (16)



Or

- (b) Explain how Prim's algorithm is used for finding the minimum spanning tree of a graph. Find a minimum cost spanning tree of the following graph using Prim's algorithm CO2-App (16)



15. (a) Write a procedure for sorting a given list of elements using Quick sort method. Show the division of the list in the quick sort for a list of 10 numbers 65,70,75,80,85,60,55,50,45,40 CO2-App (16)

Or

- (b) Explain Merge sort. Construct merge sort for the given list 42, 23, 74,11,65,58,94,36,99,87 using algorithm. CO2-App (16)

