

Roll No.

Total No. of Questions : 09]

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MCA (Sem. - 3rd)
DATA STRUCTURES
SUBJECT CODE : MCA - 302
Paper ID : [B0112]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Attempt any one question from each Sections - A, B, C & D.
- 2) Section - E is **Compulsory**.
- 3) Use of Non-programmable **Scientific Calculator** is allowed.

Section - A

(1 × 10 = 10)

Q1) Write a function that accepts two singly linked lists L_1 and L_2 . It should print L_3 , where L_3 is a singly linked list and $L_3 = L_1 \cup L_2$.

Q2) Using manual transformation, write the following expressions received after conversions:

- | | |
|---------------------------------------|---------------------|
| (a) + - * PQRS | (Convert to Infix) |
| (b) AB * C / D - | (Convert to Infix) |
| (c) (A-B) / C * D * F - C * A + D ! G | (Convert to Prefix) |
- (! Denotes Exponential Operator)

Section - B

(1 × 10 = 10)

Q3) What are the various operations possible on a doubly link list. Explain with the algorithm.

Q4) Formulate an AVL tree from the following list of numbers:

22, 16, 9, 12, 5, 11, 13, 18, 23, 12, 26, 8, 27, 23, 29

Now delete 12, 29 from the AVL tree above one after another showing each step.

Section - C

(1 × 10 = 10)

- Q5) Draw a directed graph with seven vertices and nine edges. Exactly one of the edges should be a loop, and do not have any multiple edges. Denote it using a linked representation.
- Q6) Draw an undirected graph with five edges and four vertices. The vertices should be called v_1 , v_2 , v_3 and v_4 and there must be a path of length three from v_1 to v_4 . Draw an adjacency matrix for the graph.

Section - D

(1 × 10 = 10)

- Q7) Suppose a sequence of numbers is given like: 23, 17, 25, 81, 55, 13, 58, 44. How this numbers will be sorted in Insertion Sort & Radix sort. What will be the complexity of each sort for the above sequence?
- Q8) What is a binary search tree? How is it represented in memory? Explain various application of BST.

Section - E

(10 × 2 = 20)

Q9)

- What is the advantage of using circular linked list?
- What is the shortcoming of binary search tree?
- What do you understand by the time and space complexity of any algorithm?
- What is the complexity of merge sort?
- What is a top pointer of stack?
- What is a directed graph?
- What is the difference between sequential and linked representations?
- What is hashing as a technique used for?
- To compute shortest distance from Jullundhar to Mumbai, which algorithm will be most suitable? The problem statement will be represented using which data structure?
- State a few applications of queues?

