



RAN - 2111040101050002

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MCA. (Sem - I) Examination April - 2025

Data Structure and Design and Analysis of Algorithms

(Paper - 105)

Time: 3 Hours]

[Total Marks: 70

સૂચના : / Instructions

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નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.

Fill up strictly the details of signs on your answer book

Name of the Examination:

MCA. (Sem - I)

Name of the Subject :

**Data Structure and Design and Analysis of Algorithms
(Paper - 105)**

Subject Code No.: **2111040101050002**

Seat No.:

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Student's Signature

Q.1 Do as Directed 14

A. Get postfix and prefix equivalent of following infix expression using stack table, infix expression: $A + (B - C) * D \wedge E * F$ 07

OR

A. Write algorithm/code to perform following operations -

1. Create a node structure of singly linked list of integer number.
2. insert a new elements at the last position
3. Display all element of linked list.

B. What is recursion? Write and explain a code/algorithm for recursive function to find sum of first n integer. 05

C. Define QUEUE & STACK 02

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P0727

- Q.2 Do as Directed 14**
- A. Define binary tree. Also explain each of the following with example. 07
1. complete binary tree
 2. perfect binary tree
 3. full binary tree

OR

- A. Construct the binary tree from given INORDER and POSTORDER traversals. Also find its PREORDER traversal.
- INORDER : H F L I E J G M K
POSTORDER : H L I F J M K G E
- B. Show each step of creating expression tree from given infix expression:
 $P + Q - R * S ^ (T / U)$ 05
- C Define 02**
1. height of a given node in tree ,
 2. height of the tree

- Q.3 Do as directed. 14**
- A. Explain divide and conquer approach for problem solving giving example. 07
- B. Explain - Greedy approach for problem solving. 05
- C. Write the best case and the worst-case complexity for searching in Binary Search Tree 02

- Q.4 Do as directed. 14**
- A. Explain the working of Quick sort on the following data :
{29, 32, 36, 38, 40, 44, 54} 07

OR

- A. Perform heap sort on the following data. Show each step for construction of max heap and heapsort.
{29, 32, 36, 38, 40, 44, 54}

- B. Construct a binary search tree inserting the following data in order . Show each step of construction. Also write its INORDER traversal.
15, 19, 22, 26, 28, 30, 34, 44, 60, 25 05
- C. What is AVL tree? 02

Q.5 Do as directed. 14

- A. When collision occurs in hashing? Explain open addressing as collision resolution method. 07

OR

- A. A hash table contains 11 buckets and uses separate chaining to solve collision. The key values are integers and the hash function used is $k(\text{key}) = \text{key} \% 11$. Show the table that 23, 15, 12, 20, 36, 18, 29, 40
- B. Explain any one method for hash function with example. 05
- C. List characteristics of a good hash function. 02
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