

Duration: 3 hrs

Total Marks: 80

- N.B:
- (1) Question No. 1 is Compulsory
 - (2) Attempt any **three** questions of the remaining **five** questions
 - (3) **Figures** to the **right** indicate **full** marks
 - (4) Make suitable assumptions wherever necessary with proper justifications

- 1
 - (a) Define Data Structure. Differentiate linear and non-linear data structures with example. (5)
 - (b) Write a C function to implement Insertion sort. (5)
 - (c) What are different ways to represent graphs in memory? (5)
 - (d) What is expression tree? Derive an expression tree for $(a+(b*c))/((d-e)*f)$ (5)
- 2
 - (a) What is Hashing? Hash the following data in a table of size 10 using linear probing and quadratic probing. Also find the number of collisions. (10)
63, 82, 94, 77, 53, 87, 23, 55, 10, 44
 - (b) Write a recursive function to perform pre-order traversal of a binary tree (8)
 - (c) Given an array $\text{int } a[] = \{23, 55, 63, 89, 45, 67, 85, 99\}$. Calculate address of $a[5]$ if base address is 5100. (2)
- 3
 - (a) Write a C program to convert infix expression to postfix expression. (10)
 - (b) Demonstrate step by step insertion of the following elements in an AVL tree. (10)
63, 9, 19, 18, 108, 99, 81, 45
- 4
 - (a) Write a C program to implement circular linked list that performs following functions (12)
-Insert a node in the beginning
-Insert a node in the end
-Count the number of nodes
-Display the list
 - (b) Given the frequency for the following symbols, compute the Huffman code for each symbol. (8)

Symbol	A	B	C	D	E	F
Frequency	9	12	5	45	16	13

- 5
 - (a) Explain Double Ended Queue. Write a C program to implement Double Ended Queue (12)
 - (b) Given the postorder and inorder traversal of a binary tree, construct the original tree: (8)
Postorder: D E F B G L J K H C A
Inorder: D B F E A G C L J H K
- 6 Explain following with suitable example (any two) (20)
 - I. B-tree and splay tree
 - II. Polynomial representation and addition using linked list
 - III. Topological Sorting
