

Duration: 3hrs**[Max Marks: 80]**

- N.B. :** (1) Question No 1 is Compulsory.
 (2) Attempt any three questions out of the remaining five.
 (3) All questions carry equal marks.
 (4) Assume suitable data, if required and state it clearly.

1 Attempt any FOUR**[20]**

a Match the following

A	searching through a sorted list of elements	I	O(1)
B	worst-case time complexity of inserting a node at the beginning of a singly linked list	II	Binary search tree
C	LIFO (Last in First Out) queue	III	O(n)
D	binary search tree, which traversal method visits the nodes in ascending order	IV	Stack
		V	Inorder traversal

- b What are the advantages of Linked List over an array?
 c List some applications of queue data structure.
 d Calculate the time complexity of the following code:

```

int a = 0;
for (i = 0; i < N; i++)
{
    for (j = N; j > i; j--) {
        a = a + i + j;
    }
}
  
```

e What is a postfix expression?

2 a Explain types of Trees and application of Tree Data structure with an examples.**[10]**

- b Apply the concept of link list to express the following polynomials P1 and P2 into linked list form and add them to form new polynomial P3. Write proper steps with sketches. [10]

$$P(x) = 3x^4 + 2x^3 - 4x^2 + 7$$

$$Q(x) = 5x^3 + 4x^2 - 5$$

- 3 a Explain circular queue and doubly ended Queue with examples. [10]

- b Consider the following in order and preorder traversal of a binary tree. Is it possible to obtain the POSTORDER Traversal of the same tree? If yes, construct a binary tree. [10]

In-order	D	B	E	A	F	C	G
Pre-order	A	B	D	E	C	F	G

- 4 a Explain types of operations performed on Binary Search Tree. [10]

- b List the different searching techniques. Explain with example binary search algorithm. [10]

- 5 a Construct the Huffman Tree and determine the code for each character given in the following table with occurring frequency. Justify how data compression is achieved by Huffman encoding for string message. Explain the process write proper steps with sketches. [10]

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

- b Write a short note on (any one): [10]

- Bubble Sort algorithm
- Quick Sort algorithm
- Merge Sort algorithm

- 6 a What is the use of hashing? What is mean by collision? Show hash table entries for the given dataset: 12, 45, 67, 88, 27, 78, 20, 62, 36, 55. Use modulo division method for hash table size 10. [10]

- b Write a short note on (Any one) [10]

- Tree Traversal Algorithm
- Graph Traversal Algorithm

=====End of Paper=====