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	Completeness	i	How long does it take to find a solution
B	Time Complexity	ii	How much memory need to perform the search
C	Space Complexity	iii	Is the strategy guaranteed to find the solution when there in one
D	Efficient complexity	iv	O(2^n)
		v	O(n^2)

b Explain linear and non-linear data structures with examples.

c List the practical applications of link list data structure.

d Calculate the time complexity of the following code:

```
int a = 0, b = 0;
for (i = 0; i < N; i++) {
a = a + rand ();}
for (j = 0; j < M; j++) {
b = b + rand ();}
```

e What is Stack data structure and what are its applications.

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]

$P1 = 5 X^2 + 4 X + 2$

$P2 = - 5 X – 5$

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

b Consider the following in order and preorder traversal of a 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	F	A	G	H	C
Pre-order	A	B	D	E	F	C	G	H

4 a Explain any five operations performed on Binary Search Tree. [10]

b Give different searching techniques. Explain with example binary search algorithm. [10]

5 a Explain the application of Huffman coding with an example. [10]

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

a. Bubble Sort algorithm
b. Quick Sort algorithm
c. 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]

a. Tree Traversal Algorithm
b. Graph Traversal Algorithm

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