

(3 Hours)

[Total Marks: 80]

**N.B.: (1) Question No.1 is compulsory****(2) Attempt any THREE Questions between Question No.2 to 6****Q1. Write note on following (Attempt Any Four)****[20]**

- a) Back Tracking Method
- b) Binary Search
- c) Rehashing
- d) Bubble sort
- f) Space and Time Complexity

**Q2. A) What is a Stack? Explain the push and pop algorithms on Stack.****[10]****B) What is hashing? Explain the various address calculation methods.****[10]****Q3. A) What is a Binary Search Tree (BST)? Write an algorithm to**

- i) Insert a node in BST
- ii) Find the smallest node in the BST

**[10]****B) Write an algorithm for sorting the elements using shell sort. Show the contents of the array after it has gone through a one increment pass of the shell sort. The increment factor is  $k=3$ .**

23, 3, 7, 13, 89, 66, 6, 44, 18, 90, 98, 57

**[10]****Q4. A) Explain the different types of linked list. Write an algorithm to search an element in singly linked list.****[10]****B) What is Analysis of algorithm? Explain the Asymptotic Notations (Big O,  $\Omega$ ,  $\theta$ ) used while analyzing an algorithm.****[10]****Q5. A) Define binary tree. Give the steps to convert a general tree to binary tree.****[10]****B) Given the set of symbols and corresponding frequency table as below, give the steps to find the Huffman Code**

A	G	T	K	S	Z	R	N	Y	D	M	O	I	B	C
1	2	10	2	4	5	7	6	15	4	3	8	4	2	3

**Q6. A) Define Queue. Give the algorithm to add and delete element in the queue****[10]****B) Define an expression tree. Consider following infix expression. Draw the expression tree and find prefix and postfix expressions:****(C+D+A\*B)/(E+F)+(X+Y)****[10]**

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