

(3 Hours)

Marks : 80

NB : (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 justification.

1. (a) Explain linear and non-linear data structures with suitable example. 5
 (b) Differentiate singly linked list and doubly linked list. 5
 (c) Write ADT for Queue. Also give applications for queue. 5
 (d) What is recursion ? Write a recursive function to calculate sum of n natural numbers. 5
2. (a) What are the various searching techniques ? Write a program to implement binary search. 10
 (b) What is Huffman coding ? Find the Huffman code for each character in the sentence 'DATA STRUCTURE'. 10
3. (a) Write a program to implement Singly Linked List that performs following functions : 10
 (i) Insert a node in the beginning
 (ii) Delete a specified node
 (iii) Count the number of nodes
 (iv) Search for a specific value
 (v) Displaying the list
 (b) Explain different graph traversal techniques with suitable example. 10
4. (a) What is hashing ? Store the following dataset using linear probing and quadratic probing in a table of size 11. 10
 25, 5, 10, 11, 22, 33, 40, 50, 30, 51, 31.
 (b) Write a program to convert infix expression to postfix expression using stack. 10
5. (a) Construct B-tree of order 5 for the following dataset : 10
 50, 25, 10, 5, 7, 3, 30, 20, 8, 15 .
 (b) What is a circular queue ? Write a program to implement circular queue. 10
6. Write a short notes on (**any two**) 20
 (i) AVL Trees
 (ii) Threaded binary trees
 (iii) Memory representation of graphs
 (iv) Radix sort
 (v) Sparse Matrix