QP CODE : 24787

(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 represention of graphs
(iv) Radix sort
(v) Sparse Matrix
