

(3 Hours)

Total Marks: 80

N.B: (1) Question No. 1 is compulsory

(2) Attempt any three questions out of the remaining five questions

(3) Figures to the right indicate full marks

(4) Make suitable assumptions wherever necessary with proper justifications

- Q1 A State the advantages of linked lists over arrays. [05]  
 B Create a binary search tree by inserting node values in sequence- [05]  
 56,32,12,90,-9,78,66,110,44,95.  
 C Write a program in C to check balanced parentheses using stack. [05]  
 D Explain double ended queue. [05]
- Q2 A Write a program to perform following operations on the Singly linked list [10]  
 a) Create the list  
 b) Delete first element  
 c) Insert element at end  
 d) Search an element with value=66 in the list  
 B Explain the concept of B-tree. Crate a B-tree of order-4 by inserting keys- [10]  
 5, 3, 21, 9, 13, 22, 7, 10, 11, 14, 8, 16.
- Q3 A Write a program in C to evaluate a postfix expression. [10]  
 B Explain the concept of Huffman coding and describe the steps for [10]  
 constructing a Huffman tree. Given the following characters with  
 frequencies, construct the Huffman tree and generate the Huffman codes  
 for the given characters: A:20, B:15, C:5, D:15, E:45
- Q4 A Construct an AVL tree by inserting the following elements in sequence, [10]  
 showing the tree after each insertion and rotation: 21, 26, 30, 9, 4, 14, 28,  
 18,10, 7.  
 B Write a program in C to implement stack ADT using an linked list. [10]
- Q5 A Explain the different types of linked list with diagram. Also state the [10]  
 advantages of circular and doubly linked list over singly linked list.  
 B Write a program in C to implement linear queue using array. [10]
- Q6 A Explain graph representation techniques with suitable example. [10]  
 B A hash table has 11 slots, and the following keys are inserted in this order: [10]  
 43, 36, 92, 87, 11, 47, 12, 13, 14. Using linear probing as the collision  
 resolution technique, show the final arrangement of keys in the hash table.  
 Use the hash function  $h(x) = x \% 11$ . Also count number of collisions.