

(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.

- Q.1 (a) Compare linear and non-linear data structures. [05]
 (b) Explain the advantage of circular queue over linear queue. Write a function in C language to insert an element in circular queue. [05]
 (c) Define binary search tree. Discuss the case of deletion of a node in binary search tree if node has both the children. [05]
 (d) Write a C function to search a node in doubly linked-list. [05]

- Q.2 (a) Construct AVL tree for the following sequence: [10]
 67,34,90,22,45,11,2,78,37,122
 (b) Write algorithm for postfix evaluation. Demonstrate the same step by step for the expression: $9\ 6\ 7\ * \ 2 \ / \ -$ [10]

- Q.3 (a) Write a program to perform following operations on a circular linked list: [10]
 i) insert a node from the end of the list, ii) delete first node,
 iii) count the number of nodes with even values, iv) display the list.
 (b) Write a C program to simulate linear queue as linked list. [10]

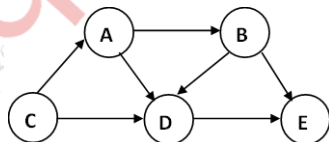
- Q.4 (a) Construct Huffman tree and find the Huffman codes for each symbol given below with frequency of occurrence: [10]

| | | | | | |
|-----------|----|----|----|----|----|
| Symbol | p | g | e | r | i |
| Frequency | 20 | 17 | 33 | 25 | 40 |

- (b) Explain the various ways to represent graph in the memory with example. [05]
 (c) Construct binary search tree from given traversal sequences: [05]

| | | | | | | | | | | |
|---------------------|---|---|---|---|---|---|---|---|---|---|
| In-order traversal | D | E | B | A | C | F | G | I | H | J |
| Pre-order traversal | F | E | D | C | B | A | G | H | I | J |

- Q.5 (a) Apply linear probing to hash the following values in a hash table of size 11 and find the number of collisions: 67,44,90,12,83,52,23,87,79. [10]
 (b) Define topological sorting. Perform topological sorting for the following graph: [10]



- Q.6 (a) Construct a B tree of order 3 by inserting the following given elements as: [10]
 77,97,75,64,53,14,26,49,82,59.
 Show the B tree at each step of insertion.
 (b) Write a function in C for DFS traversal of graph. Explain DFS graph traversal with suitable example. [10]