(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

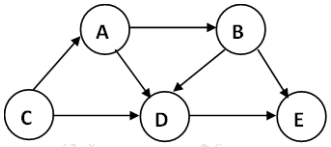
(b) Explain the various ways to represent graph in the memory with example. [05]

(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: 77,97,75,64,53,14,26,49,82,59. [10]
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]

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