

Duration: 3 Hours

Total Marks: 80

- N.B: (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 justifications

1. (a) What are various operations possible on data structures? (05)  
 (b) What are different ways of representing a Graph data structure on a computer? (05)  
 (c) Describe Tries with an example. (05)  
 (d) Write a function in C to implement binary search. (05)

2. (a) Use stack data structure to check well-formedness of parentheses in an algebraic expression. Write C program for the same. (10)

(b) Given the frequency for the following symbols, compute the Huffman code for each symbol. (10)

Symbol	A	B	C	D	E
Frequency	24	12	10	8	8

3. (a) Write a C program to implement priority queue using arrays. The program should perform the following operations: (12)  
 i. Inserting in a priority queue  
 ii. Deletion from a queue  
 iii. Displaying contents of the queue

(b) What are expression trees? What are its advantages? Derive the expression tree for the following algebraic expression:  $(a + (b/c)) * ((d/e) - f)$  (08)

4. (a) Write a C program to represent and add two polynomials using linked list. (12)  
 (b) How does the Quicksort technique work? Give C function for the same. (08)

5. (a) What is a doubly linked list? Give C representation for the same. (05)

(b) Given the postorder and inorder traversal of a binary tree, construct the original tree:  
 Postorder: D E F B G L J K H C A (10)  
 Inorder: D B F E A G C L J H K

(c) What is hashing? What properties should a good hash function demonstrate? (05)

6. (a) Given an array  $\text{int a[]} = \{69, 78, 63, 98, 67, 75, 66, 90, 81\}$ . Calculate address of  $a[5]$  if base address is 1600. (02)

(b) Give C function for Breadth First Search Traversal of a graph. Explain the code with an example. (10)

(c) Write a C program to implement a singly linked list. The program should be able to perform the following operations: (08)

- (i) Insert a node at the end of the list  
 (ii) Deleting a particular element  
 (iii) Display the linked list

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