

**II B.Tech I Semester Supplementary Examinations, May 2005**  
**DATA STRUCTURES THROUGH C**  
( Common to Civil Engineering, Mechanical Engineering, Computer Science  
& Engineering, Electronics & Instrumentation Engineering, Information  
Technology, Electronics & Control Engineering, Mechatronics and Production  
Engineering)

**Time: 3 hours****Max Marks: 70**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

\*\*\*\*\*

1. Declare structures of type students including fields for storing information regarding students of your class i.e., serial numbers, names, heights, weights, addresses and hobbies. Write a program to input 50 structures of this type and store them in a file. Now read these structures from the file, sort them on names and write them into another file. State any assumptions that you make explicitly.
2. Write a function that performs binary search for an element in the array of integers passes to it as a parameter.
3. Give an algorithm to evaluate an expression in postfix form. Illustrate the algorithm using a suitable example.
4. Give a structure declaration for storing the terms of a polynomial. Assume that two polynomials are stored as linked lists of records of the given type in descending order of exponents. Write a function to add the two polynomials and produce a third one.
5. (a) Calculate the fraction of pointers wasted in a linked representation of a full binary tree of degree  
    i. 2 and  
    ii. 3 of level n.  
    Comment on the result.  
    (b) Suppose that you are given two sequences that supposedly correspond to the preorder and inorder traversals of a binary tree. Prove that it is possible to construct the binary tree uniquely.
6. Write a C function to perform Breadth first search on an undirected graph starting from vertex1. Mention the graph representation used and illustrate your algorithm with a suitable example.
7. Write a recursive program to implement quick sort on an array of 16 integers and illustrate its working with the help of an example.
8. Describe some applications of trees emphasizing the suitability of tree data structures for these applications.

\*\*\*\*\*