

**II B.Tech I Semester Supplementary Examinations, February 2008**  
**DATA STRUCTURES THROUGH C**  
( Common to Mechanical Engineering, Mechatronics, Metallurgy &  
Material Technology, Production Engineering, Aeronautical Engineering  
and Automobile Engineering)

**Time: 3 hours**

**Max Marks: 80**

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

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1. Write a C program to find mean, standard deviation and variance of a set of elements  
[16]
2. (a) What are the advantages and disadvantages of linear linked lists.  
(b) Write the applications of singly linked list, double linked list and circular linked lists.  
[5+11]
3. (a) Define recursion. What are the properties of recursive definition .  
(b) Write a recursive definition of  $a + b$  , where  $a$  and  $b$  are nonnegative integers, in terms of the successor function  $\text{succ}$  , defined as  
     $\text{succ}(x)$   
    int  $x$ ;  
    {  
    return  $(x++)$ ;  
    }  
(c) Write a recursive algorithm to compute the product of two non negative integers  
[3+7+6]
4. (a) Mention and explain various types of queues and give an example for each  
(b) Compare various types of queues.  
[8+8]
5. (a) Describe different types of trees.  
(b) Write a C program to implement Binary tree.  
[6+10]
6. (a) What are the advantages of adjacency matrix representation of graphs.  
(b) Define spanning tree of an undirected graph.  
[8+8]
7. (a) Distinguish between linear and binary search methods.  
(b) Write an algorithm for non-recursive binary search method.  
[8+8]
8. Write an algorithm for heap sort and write a C program for implementing the same.  
[16]

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1. Write a C program to find mean, standard deviation and variance of a set of elements  
[16]
2. (a) Define a doubly linked list. Write an algorithm to insert and delete a node in a doubly linked list.  
(b) List the applications of doubly linked lists. [12+4]
3. (a) Write a 'C' Program to convert an infix expression into prefix expression  
(b) Transform the following expression to prefix, using the approach  
 $(A + B) * (C * (D - E) + F) - G$  [8+8]
4. (a) Mention and explain various types of queues and give an example for each  
(b) Compare various types of queues. [8+8]
5. Write a C program to create a tree and traversing the same in preorder and post order  
[16]
6. (a) List and explain about the basic operations on a graph.  
(b) Write a C program for depth first search of a graph. [7+9]
7. (a) Distinguish between linear and binary search methods.  
(b) Write an algorithm for non-recursive binary search method. [8+8]
8. Write an algorithm for quick sort. What is its time complexity. [16]

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1. Write a C program to print the lower triangular of a given square matrix. [16]
2. (a) Define a doubly linked list. Write an algorithm to insert and delete a node in a doubly linked list.  
(b) List the applications of doubly linked lists. [12+4]
3. (a) Derive a method to convert a postfix expression into its prefix form  
(b) Consider the following arithmetic expression in postfix notation: 7 5 2 + \* 4 1 5 - / -
  - i. Find the equivalent prefix form of the above .
  - ii. Obtain the computed value of the expression from its postfix notation [8+4+4]
4. (a) Mention and explain various types of queues and give an example for each  
(b) Compare various types of queues. [8+8]
5. Write a C program for creating, inserting and deletion in a Binary tree. [16]
6. (a) List and explain about the basic operations on a graph.  
(b) Write a C program for depth first search of a graph. [7+9]
7. (a) Using linear search delete the number 17 from the list of numbers and give the steps.  
42,12,10,91,17,59.  
(b) Write a C program to implement the same. [8+8]
8. (a) compare quick sort and heap sort methods.  
(b) Explain quick sort method for the elements.  
11,51,71,21,61,41,91,31, [8+8]

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1. Write a C program to replace a particular word by another word in a given line of text. [16]
2. (a) Define a doubly linked list. Write an algorithm to insert and delete a node in a doubly linked list.  
(b) List the applications of doubly linked lists. [12+4]
3. (a) Given a sequence of push and pop operations and an integer representing the size of an array in which a stack is to be implemented. Design an algorithm to determine whether or not overflow occurs. The algorithm should not use a stack.  
(b) Explain what test is required for exceptional conditions in pop operations. [8+8]
4. (a) Mention and explain various types of queues and give an example for each  
(b) Compare various types of queues. [8+8]
5. Write a C program to create a tree and traversing the same in preorder and post order [16]
6. (a) What are the advantages of adjacency matrix representation of graphs.  
(b) Define spanning tree of an undirected graph. [8+8]
7. (a) Using linear search delete the number 26 from the list of numbers and give the steps.  
10,7,17,26,32,92  
(b) Write a C program to implement the same. [8+8]
8. Write an algorithm for heap sort and write a C program for implementing the same. [16]

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