

**B.TECH.**  
**THEORY EXAMINATION (SEM-IV) 2016-17**  
**DATA STRUCTURE**

*Time : 3 Hours*

*Max. Marks : 100*

*Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.*

**SECTION A**

**1. Answer all the questions.**

**10x2=20**

- a) Given a 2-D Array A [-100: 100, -5: 50]. Find the address of element A [99, 49] considering base address 10 and each element requires 4 bytes for storage. Follow row major order.
- b) Write down the difference between static and dynamic memory.
- c) What is the advantage of doubly linked list over singly linked list? What is an algorithm?
- d) What is recursion? A recursive procedure should have two properties. What are they?
- e) Define the following: (i) Tree (ii) Level of a node. (iii) Height of a tree.
- f) Write down any four applications of queues.
- g) Define garbage collection and compaction
- h) What is a sparse matrix? How is it stored in the memory of a computer?
- i) Differentiate between Linear and Non-Linear Data Structures with examples.
- j) Define adjacency matrix with suitable example.

**SECTION B**

**2. Answer any five questions from this section. 5x10=50**

- a) Explain Breadth First Search with suitable example.
- b) Explain Kruskal's algorithm to find minimum spanning tree in a weighted directed graph. Can there be two minimum spanning trees of given weighted directed graph?
- c) Convert  $E=abcde^{**}+$  postfix expression to infix and prefix using stack.
- d) Write an algorithm for finding solution to the Towers of Hanoi problem. Explain the working.
- e) Write a C-Function for Linked List Implementation of stack. Write all the Primitive Operations.
- f) Perform the Merge Sort on following set of elements. Also, write merge sort algorithm. 18, 25, 4, 26, 10, 15, 20, 5.
- g) Why circular queue is used over simple queue? Write algorithms to implement all operations in a circular queue using arrays.
- h) Explain binary search tree and its operations. Make a binary search tree for the following sequence of numbers, show all steps : 45,32,90,34,68,72,15,24,30,66,11,50,10 .

**SECTION C**

Answer any two questions of the following. Each question carries equal marks. 2x15=30

3. a) Draw a binary tree which has following traversal

Inorder : D J G B A E H C F I

Preorder : A B D G J C E H F I

b) Explain threaded binary tree with suitable example.

4. i) What are doubly linked lists? Write a C program to create doubly linked list.  
ii) Define internal sorting techniques

5. Write short notes on any three of the following

- a) Huffman Algorithm
- b) Depth First Search
- c) Priority Queue
- d) Abstract Data Type(ADT)