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**B TECH**  
**(SEM III) THEORY EXAMINATION 2017-18**  
**DATA STRUCTURES**

**Time: 3Hours**

**Max. Marks: 70**

**Note:** Attempt all Sections. Assume missing data, if any.

**SECTION A**

**1. Attempt all questions in brief:**

**2 x 7 = 14**

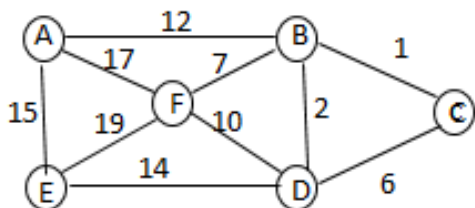
- a. Define the term Data Structure. List some linear and non-linear data structures stating the application area where they will be used.
- b. Discuss the concept of "successor" and "predecessor" in Binary Search Tree.
- c. Convert the following arithmetic infix expression into its equivalent postfix expression.  
Expression:  $A-B/C+D * E + F$
- d. Explain circular queue. What is the condition if circular queue is full?
- e. Calculate total number of moves for Tower of Hanoi for  $n=10$  disks.
- f. List the different types of representation of graphs.
- g. Explain height balanced tree. List general cases to maintain the height.

**SECTION B**

**2. Attempt any three of the following:**

**7 x 3 = 21**

- a. What do you understand by time space trade off? Explain best, worst and average case analysis in this respect with an example
- b. Use quick sort algorithm to sort 15,22,30,10,15,64,1,3,9,2. Is it a stable sorting algorithm? – Justify.
- c. Define spanning tree. Also construct minimum spanning tree using prim's algorithm for the given graph.



- d. Define tree, binary tree, complete binary tree and full binary tree. Write algorithms or function to obtain traversals of a binary tree in preorder, postorder and inorder.
- e. Construct a B-tree on following sequence of inputs.  
10, 20, 30, 40, 50, 60, 70, 80, 90  
Assume that the order of the B-tree is 3.

**SECTION C**

**3. Attempt any one part of the following:**

**7 x 1 = 7**

- (a) What are the various asymptotic notations? Explain Big O notation.
- (b) Write an algorithm to insert a node at the end in a Circular linked list.

- (a) What is a Stack. Write a C program to reverse a string using stack.  
(b) Define the recursion. Write a recursive and non recursive program to calculate the factorial of the given number.

5. Attempt any *one* part of the following:

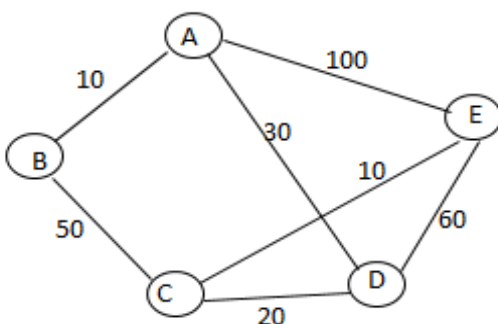
7 x 1 = 7

- (a) Draw a binary tree with following traversals:  
Inorder: B C A E G D H F I J  
Preorder: A B C D E G F H I J  
(b) Consider the following AVL Tree and insert 2, 12, 7 and 10 as new node. Show proper rotation to maintain the tree as AVL.

6. Attempt any *one* part of the following:

7 x 1 = 7

- (a) What is a Threaded Binary Tree? Explain the advantages of using a threaded binary tree.  
(b) Describe Dijkstra's algorithm for finding shortest path. Describe its working for the graph given below.



7. Attempt any *one* part of the following:

7 x 1 = 7

- (a) Write short notes on:  
i. Hashing Technique  
ii. Garbage collection  
(b) Explain the following:  
i. Heap Sort  
ii. Radix Sort.