B.TECH.
THEORY EXAMINATION (SEM-IV) 2017-18
DATA STRUCTURES

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. **Attempt all of the following questions:**   (10 x 2 = 20)

   (a) What is an abstract data type? Give a suitable example for ADT.

   (b) Define time complexity and space complexity of an algorithm.

   (c) What is link list? How it is different from an array?

   (d) Difference between overflow and underflow condition in link list.

   (e) What are the merits and demerits of array data structures?

   (f) Differentiate linear and non linear data structures.

   (g) Give the worst case and best case time complexity of binary search.

   (h) Define a complete binary tree with suitable example.

   (i) Define minimum spanning tree with suitable example.

   (j) What is row major and column major order? Define the formula for both.

SECTION – B

Attempt any five of the following questions: (5 x 10 = 50)

2. What is circular queue? Write a C code to insert an element in circular queue.

3. What is stack? Implement stack with singly link list.

4. Convert the following infix expression into its equivalent postfix expression.
   Expression: A-B/C+D*E+F

5. What is tower of Hanoi problem? Write the steps for movement of 3 plates.

6. Sort the given values using quick sort; shows all steps/iterations:
   38,81,22,48,13,69,93,14,45,58,79,72.

7. What is a Threaded Binary Tree? Explain the advantages of using a threaded binary tree.

8. Define the recursion. Write a recursive and non-recursive program to calculate the factorial of the given number.

9. Draw a binary tree with following traversals:
   In-order: B C A E G D H F I J
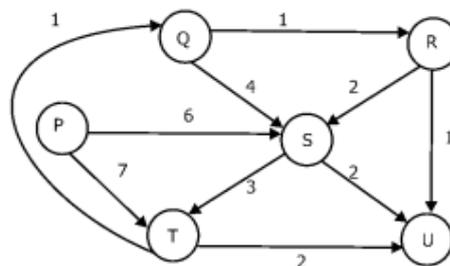   Preorder: A B C D E G F H I J

SECTION – C

Attempt any two of the following questions: **(2 x 15 = 30)**

10. Write Kruskal's algorithm. Find the minimum Spanning tree using Kruskal's algorithm in below figure:
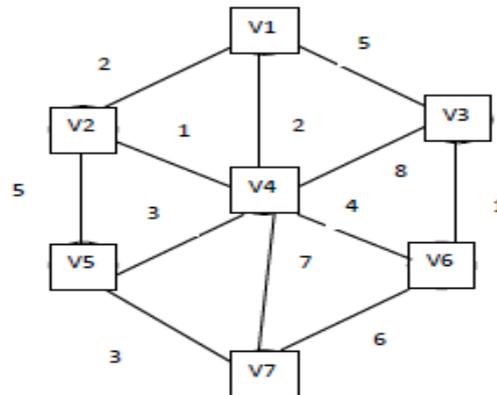
11. Find the single source shortest path from the following graph using Dijkstra's algorithm. Show all the steps of algorithm properly.

12. Wire short note on any three :
    a.   Hashing Technique.
    b.   Heap Sort
    c.   Garbage collection
    d.   Radix Sort