

B.Tech II Year I Semester (R13) Regular &amp; Supplementary Examinations December 2015

**DATA STRUCTURES**  
(Computer Science and Engineering)

Time: 3 hours

Max. Marks: 70

**PART – A**  
(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- Write down the applications of stacks.
  - What is abstract data type? Write the abstract data type for stack.
  - Give brief description on the variations of insertion.
  - List the various representations of a tree? Give example for each.
  - Write an algorithm to determine the connected components.
  - Which data structure is used efficiently to reduce the ordered map? What is its average time complexity?
  - Write the class definition of a double – ended priority queue.
  - Let  $r$  be the root of the leftist tree that has  $n$  (internal) nodes. Prove that  $n \geq 2^{\text{shortest}(r)-1}$ .
  - What are the different types of characterization rotations available for AVL trees?
  - Define a B – tree. List the properties of B – trees.

**PART – B**  
(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

- 2 With the help of a neat sketch, explain Software Development Life Cycle.  
Give brief description about the linked representation of stacks.

OR

- 3 (a) What is linked list? Explain insertion of a new node into single linked list at various possible positions.  
(b) Distinguish between tree, binary tree and binary search tree.

**UNIT – II**

- 4 What is time complexity? Derive the average case time complexity for quick sort.

OR

- 5 What is meant by traversal? With the help of an example, explain the various tree traversal techniques.

**UNIT – III**

- 6 List the applications of graphs? Explain the common graph representation techniques.

OR

- 7 When dynamic hashing will be used? Describe the various dynamic hashing techniques with suitable example.

**UNIT – IV**

- 8 What are Meldable priority queues? Explain them with suitable example.

OR

- 9 Give brief description about the Binomial Heaps.

**UNIT – V**

- 10 Construct optimal binary search tree from the data: Let  $n = 4$  and  $(a_1, a_2, a_3, a_4) = (10, 15, 20, 25)$ . Let  $(p_1, p_2, p_3, p_4) = (3, 3, 1, 1)$  and  $(q_0, q_1, q_2, q_3, q_4) = (2, 3, 1, 1, 1)$ .

OR

- 11 (a) Distinguish between B – tree and B<sup>+</sup> – Tree.  
(b) Write short notes on Red – Black trees.

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