

[4]

- d) Describe the routine for minimum cost spanning tree using a suitable example with graphical representation.

OR

Differentiate between depth first search and breadth first search traversal using example having 2 as the source.

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Total No. of Questions : 5]

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Roll No .....

**CS/IT-305**

**B.E. III Semester**

Examination, December 2016

**CS - 305 : Data Structure**

**IT - 305 : Data Structure and Algorithm**

*Time : Three Hours*

*Maximum Marks : 70*

- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.  
ii) All parts of each questions are to be attempted at one place.  
iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.  
iv) Except numericals, Derivation, Design and Drawing etc.

**Unit - I**

1. a) Explain Recursive algorithm.  
b) Describe tower of Hanoi problem.  
c) Consider  $T(n) = 14T\left(\left\lceil \frac{n}{2} \right\rceil\right) + n^2$ . Explain in detail and find out the asymptotic bound using recursion tree method?  
d) Explain different type of asymptotic analysis with graphical representation of the at-least five algorithms.

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OR

Explain various algorithm used in data structure. Also differentiate single and multiple-dimensional array with suitable example.

### Unit - II

2. a) Compare singly linked list and two-way header list.
- b) Describe different ways stack representation.
- c) Explain doubly linked list with example.
- d) Convert the following infix expression to the prefix expression. Show all steps.
  - i)  $A \wedge B * C - D + E | F | (G + H)$
  - ii)  $(A + B) * (C \wedge (D - E) + F) - G$

OR

A binary tree has 9 nodes. Inorder and Preorder traversal of tree yield following sequence of nodes :

INORDER : EACKFHDBG

PREORDER : FAEKCDHGB, Draw the tree.

### Unit - III

3. a) In what way is a AVL tree better than a Binary tree?
- b) Explain Binary tree traversing.
- c) What is the difference between an AVL tree and a Binary tree? Using example?

- d) Insert these keys into an AVL tree. 342, 206, 444, 523, 607, 301, 142, 183, 102, 157 and 149. Illustrating problematic insertion.

OR

Explain the AVL tree insert method and explain why its insertion time complexity is still of the same order as Binary tree.

### Unit - IV

4. a) Differentiate between static and dynamic tree tables.
- b) Explain collision resolution strategies.
- c) Consider following list of elements as :  
50, 40, 20, 70, 15, 35, 20, 60 sort the sequence using merge sort show all steps?
- d) What is a stable sorting algorithm? Which of the sorting algorithm. We have seen are stable and unstable using a suitable example? Prove that counting sort is stable?

OR

Suppose the elements in the array are :

$A = \langle 2, 13, 5, 18, 14, 20 \rangle$  Does this array can be represent in INSERTION SORTING? Justify your answer will all the steps?

### Unit - V

5. a) Explain symmetric and asymmetric matrix of graphs.
- b) Explain sequential representations of graphs.
- c) Explain spanning tree and its components.