

Roll No. 

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CSE/IT) (2011 Batch) (Sem.-3)

**DISCRETE STRUCTURES**

Subject Code : BTCS-302

Paper ID : [A1124]

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A****1. Write briefly :**

- a. How many words of three different letters can be formed from the letters of the word 'COMPUTER'?
- b. Give an example of semi group but not monoid.
- c. Prove that  $A - B = A \cap B^c$ .
- d. Is every relation which is symmetric and transitive on a set A, always reflexive? Why or why not?
- e. Define ring.
- f. What is the minimum number of NOR gates required to construct an AND gate? Construct it.
- g. Define graph isomorphism. Give an example of isomorphic and non-isomorphic graphs.
- h. A graph consists of four vertices of degree three and an isolated vertex. Find the number of edges in the graph.
- i. Define Euler graph.
- j. Define Chromatic number.

## SECTION-B

2. Show that the relation  $x \leq y$  defined on the set of integers is a partial order relation.
3. Prove that a finite integral domain is a field.
4. There are 3 toys to be distributed among 7 children. In how many way can it be done such that
  - a. No child gets more than one toy.
  - b. There is no restriction as to the number of toys any child gets.
  - c. No child gets all toys.
5. For any sets A and B, prove :
  - a.  $(A \cup B)^c = A^c \cap B^c$
  - b.  $(A \cap B)^c = A^c \cup B^c$
6. Define a cyclic group with an example. Prove that every cyclic group is abelian.

## SECTION-C

7. Solve  $y_{n+1} - 4y_n + 3y_{n-1} = 4$ ,  $y_0 = 1$ ,  $y_1 = 0$  by finding the generating function of  $y_n$ .
8. Consider the group  $G = \{1, 2, 3, 4, 5\}$  under multiplication modulo 6.
  - a. Find the multiplication table of G.
  - b. Prove that G is a group.
  - c. Find  $2^{-1}$ ,  $3^{-1}$  and  $1^{-1}$ .
  - d. Find the order and subgroups generated by 2 and 3.
  - e. Is G cyclic? Justify your answer.
9. Write short notes on :
  - a. Generating functions
  - b. Boolean Algebra and its applications