Roll No.

Total No. of Pages : 02

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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