00681

B.Tech. COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

Term-End Examination

December, 2013

BICS-008 : DISCRETE MATHS STRUCTURE

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any seven** questions. All questions carry **equal** marks. All questions are to be answered in english language only.*

1. Show that the relation (x,y) R (a,b) $\Leftrightarrow$ $x^2 + y^2 = a^2 + b^2$ is an equivalence relation and describe the equivalence clsses. **10**

2. Let f : $x \rightarrow y$ be an everywhere defined invertible function. If A and B are two arbitrary non - empty subsets of y, then show that $f^{-1}(A \cup B) = f^{-1}(A) \cup f^{-1}(B)$ **10**

3. State and prove Lagrange's theorem. **10**

4. Show that the set of rational numbers forms a field under the operations of ordinary addition and multiplication. **10**

5. Explain the following : **5+5=10**
   (a) OR gate
   (b) NAND gate

6. Convert the Boolean function 5+5=10
   $f(x, y, z) = (x' + y + z')(x' + y + z)(x + y' + z)$ in disjunctive normal form.

7. Construct a truth table for each compound 10
   proposition
   (a) $p \wedge (q \vee q)$
   (b) $\sim (p \vee q) \vee (\sim p \wedge \sim q)$

8. Prove that the following propositions are 10
   tantology :
   (a) $p \vee \sim p$
   (b) $\sim (p \wedge q) \vee q$

9. Use generating functions to solve the recurrence 10
   relation
   $a_{n+2} - 2a_{n+1} + a_n = 2^n, a_0 = 2, a_1 = 1.$

10. Write short notes on **any two** of the following : 5+5
    (a) Unilaterally connected graphs
    (b) Planar Graphs
    (c) Isomorphism and Homeomorphism of Graphs.

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