BICS-008

B.Tech. COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

01000

Term-End Examination

June, 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. Let A, B, C be any three sets. Then show that :   **10**
    (a) $A - (B \cap C) = (A - B) \cup (A - C)$
    (b) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

2. Let $A = \{1, 2\}$ and $B = \{a, b\}$. Find all functions   **10**
    $f : A \rightarrow B$ and verify each of the functions for one-one and onto properties.

3. Show that a non-empty subset H of a group   **10**
    (G, *) is a subgroup of (G, *) if and only if
    $a, b \in H \Rightarrow a + b^{-1} \in H$,
    Where b^{-1} is the inverse of b in G.

4. Show that every group of prime order is cyclic   **10**
    but converse is not true.

5. Draw the Hasse diagram for the partial ordering   10
   { (A, B) : A ≤ B } on the power set P(s) where
   S = { a, b, c }.

6. Simplify the following using Boolean algebra.   10
   (a)   (A B' C' + AB' C + ABC + AB' C) (A + B)
   (b)   P + P'QR' + (Q + R)'

7. Show that :   10

   $(p \lor q) \land (\sim p \land \sim q)$ is a contradiction

8. By the principle of mathematical induction, prove   10
   that :
   $3^{2n+1} + (-1)^n 2 \equiv 0 \pmod 5$

9. Show that every self-complementary graph has   10
   4k or 4k + 1 vertices.

10. Write short notes on *any two* of the following :   5+5
    (a)   Product of Graphs
    (b)   Composition of Graphs
    (c)   Graph colouring.

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