B.Tech. – VIEP – COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

Term-End Examination

00666

June, 2015

BICS-008 : DISCRETE MATHEMATICAL STRUCTURES

Time : 3 hours   *Maximum Marks : 70*

Note : *There are seven questions. Attempt any **five** questions. All questions carry equal marks.*

1. (a)   Prove that the relation of similarity in the set of all triangles in a plane is an equivalence relation.   7

    (b)   Prove that $A - (B \cup C) = (A - B) \cap (A - C)$, where A, B and C be any sets.   7

2. (a)   If G is a group such that $(ab)^n = a^n b^n$ for three consecutive integers n for all a, b $\in$ G, show that G is abelian.   7

    (b)   Prove that the intersection of any two subgroups of a group G is again a subgroup of G.   7

3. (a) Show that it is not necessary that union of two sublattices is again a sublattice. **7**

(b) Express the following function in disjunctive normal form : **7**

$$f(x, y, z) = (x + y) (z'y')'$$

4. (a) Prove that

$$P \oplus Q = \rceil (P \leftrightarrow Q).$$ **7**

(b) Show that

$(P \wedge Q) \rightarrow (P \vee Q)$ is a tautology. **7**

5. (a) Use induction to prove that any integer $n \geq 2$ is either a prime or a product of primes. **7**

(b) Prove that two graphs are isomorphic, iff their complements are isomorphic. **7**

6. (a) Find the chromatic polynomial of K_4, complete graph of 4 vertices. **7**

(b) Give the set of those real numbers x for which the truth value of $p \wedge q$ is true, where $p : x > - 2$ and $q : x + 3 \neq 7$. **7**

7. (a) Define path, walk, connected graph, tree and give examples. 7

(b) Prove that the pentagonal lattice is not modular. 7

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