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Roll No. DSE/2K9/036

THIRD SEMESTER

B.Tech.(SE)

MID SEMESTER EXAMINATION

SEPTEMBER-2010

SW- 206 DISCRETE MATHEMATICS

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note :	Answer ***ALL*** questions by selecting any ***TWO*** parts from each. Assume suitable missing data, if any.

1[a] Let the proposition p be "Mark is rich" and q be "Mark is happy". Write each of the following in symbolic form :

(i) Mark is poor but happy.

(ii) Mark is neither poor nor happy

(iii) Mark is either rich or happy

(iv) Mark is either poor or else' he is both rich and happy

(v) Mark is either poor or happy.

(vi) If mark is happy then he is not rich.

[b] By using algebra of proposition, show that

(i) $[\sim p \wedge (\sim q \wedge r) \vee (q \wedge r) \vee (p \wedge r)] \Leftrightarrow r$

(ii) $[(\sim p \vee q) \wedge (p \wedge (p \wedge q))] \Leftrightarrow p \wedge q$

[c] (i) Prove that the following argument is valid : If a baby is hungry, then the baby cries. If the baby is not mad then he does not cry. If a baby is mad, then he has a red face. Therefore if a baby is hungry then he has a red face.

(ii) Without using truth table, prove that $\sim p$ is a valid conclusion from $p \Rightarrow \sim q,\ r \Rightarrow q,\ r$

2[a] Define the following terms;

Well formed formula, predicate, compound proposition, tautology, contradiction, contingency and valid argument.

[b] A relation R on a set X is called circular if (a, b) ε R and (b, c) ε R implies (c, a) ε R.

Show that a relation R is reflexive and circular iff it is an equivalence relation.

[c] Let R be an equivalence relation on a set X, show that the equivalence classes of R are either disjoint or identical.

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3[a] Consider an algebraic structure (G, *) where G is the set of all non –zero real numbers and * is a binary operation on G defined by

$$a * b = \frac{ab}{4}$$

show that (G, *) is an abelian group.

[b] Prove that the inverse of an element in the group is unique.

[c] Define partial order relation and show that the relation “divides” defined on the set of natural numbers is a partial order relation.

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