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Reg. No. : ....

Name : ....

Third Semester B.Tech. Degree Examination, December 2012
(2008 Scheme)
08.303 : DISCRETE STRUCTURES (R F)

Time : 3 Hours Max. Marks :100

PART – A

Answer **all** questions. (**Each** question carries **4** marks)

1. Define well formed formula. Give an example.
2. Draw the truth table for biconditional.
3. Show that the truth value of $(P \rightarrow Q) \rightleftarrows (\urcorner P \vee Q)$ is independent of its components.
4. State and prove De Morgan's laws.
5. Is it possible to have a relation which is symmetric transitive and irreflexive ? Why ?
6. Define compatibility relation. Give two examples.
7. Define a one to one correspondence between set of positive real numbers and set of real numbers between 0 and 1.
8. Define a strongly connected graph. Give an example.
9. Define an abelian group. Give example.
10. Define integral domain. Give an example.

PART – B

Module – 1

11. a) Show that SVR is tantologically implied by $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$ using rules of inference. 10

    b) Show that $(x)(P(x) \vee Q(x)) \Rightarrow (x) P(x) \vee (\exists x) Q(x)$ 10

OR

12. Show that from $(\exists x)(F(x) \wedge S(x)) \rightarrow (y)(M(y) \rightarrow W(y))$ and $(\exists y)(M(y) \wedge \urcorner W(y))$ the conclusion $(x)(F(x) \rightarrow \urcorner S(x))$ follows. 20

Module – 2

13. a) Show that every equivalence relation R on a set generates a unique partition of the set and blocks of the partition correspond to R equivalence classes. 10

    b) Determine the quotient set of congruence modulo 3 relation R on Z where Z is the set of positive integers. 10

OR

14. a) Show that $2^n > n^3$ for $n \geq 10$. 10

    b) Show that set of even numbers is denumerable. 10

Module – 3

15. a) Let $X = \{1, 2, 3, 4\}$ and $f : X \rightarrow x$ be given by $f = \{(1, 2), (2, 3), (3, 4), (4, 1)\}$ and F^0 is the identity mapping on X. $F^2 = f o f$, $f^3 = f^2 \circ f$, $f^4 = f^3 \circ f$ and $F = \{f^0, f^1, f^2, f^3\}$. Show that the algebraic systems $< F, 0 >$ and $< z_4, +_4 >$ are isomorphic. 10

    b) Show that order of a subgroup divides order of the group. 10

OR

16. a) Show that (I, +), where I is the set of integers is an abelian group. 10

    b) Define boolean algebra. Give an example. Enumerate its properties. 10