[07 – 2217]

II/IV B.Tech. DEGREE EXAMINATION.

Second Semester

Computer Science and Engineering

DISCRETE MATHEMATICAL STRUCTURES — II

(Common with Information Technology)

(With Effective from the admitted batch of 2007–2008)

Time : Three hours Maximum : 70 marks

First question is compulsory

Answer any FOUR from the remaining questions.

All questions carry equal marks.

1. (a) What is meant semi-group?

   (b) What is meant by hashing function? Give one example.

   (c) Describe the mathematical notation of the tuning machine?

   (d) What is meant by FOSET? (Totally ordered set)

   (e) Describe the properties of the Regular grammar.

(f) What is meant by Recursion? Give one example of reursive function?

(g) What is meant by partition and covering of a set? Give one example?

2. (a) Let R. denote a section on the set of ordered Paris of positive integers. Such that $(x,y)R\,(U,V)$ iff $xv = yu$. Show that R is an equivalence relation.

(b) What is meant by relation? Explain different properties of relation.

3. (a) Show whether the following relation are transitive is $R_1 = \{(1,1)\} R_2 = \{(1,2),(2,2)\}$

$R_3 = \{(1,2),(2,3),(1,3),(2,1)\}$.

(b) Show that the function

$$fx = \begin{cases} x/2 & \text{when } x \text{ is even} \\ (x-1)/2 & \text{when } x \text{ is odd} \end{cases}$$

is primitive recursive.

4. (a) Show that the function

$f(x,y) = x - y$ in partial recursive.

(b) Let $S^1 = \{a,b\}$, show that the semigroup is $(s^{S^1},0)$ not commutative?

5. (a) State and explain the Fermat's theorem?

(b) State and prove Euler's theorem.

6. (a) Show that in a lattice if $a \leq b \leq c$ then

$a \oplus b = b * c$ and $(a * b) \oplus (b * c) =$

$b = (a \oplus b) * (a \oplus c)$.

(b) Show that a chains of three or more elements is not complemented?

7. (a) Find the value of

$$x_1 * x_2 * \left[(x_1 * x_4) \oplus x_2^{1} \oplus (x_3 * x_1^{1})\right]$$

(b) Obtain the sum-of production canonical form of the Boolean expression: $(x_1 * x_2^{1}) \oplus x_4$.

8. (a) Construct Tuning machine that will compute $f(x,y)$ when f is binary addition.

(b) Construct the Finite – Automata $\{a^n b^n | n \geq 1\}$.
