Code: 13A05302

R13

B.Tech II Year I Semester (R13) Regular Examinations December 2014

DISCRETE MATHEMATICS

(Common to IT and CSE)

Time: 3 hours   Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

- (a) Without using truth table show that $P \to (Q \to P) \Rightarrow \neg P \to (P \to Q)$
- (b) State Boolean algebra.
- (c) When a lattice is said to be bounded?
- (d) Prove that p, p $\to$q, q$\to$r $\Rightarrow$ r.
- (e) State necessary and sufficient conditions for the existence of an Eulerian path is connected.
- (f) Prove that the identity of a subgroup is same as that of the group.
- (g) What is a group?
- (h) Find the recurrence relation satisfying the equation $y_n = A(3)^n + B(-4)^n$
- (i) What is the generating function of the sequence {0, 1, 0-1, 0, 1, 0, -1, 0…….}?
- (j) What is a tree?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 Use pigeonhole principal to show that in any set of eleven integers, there are two integers whose difference in divisible by 10.

OR

3 Write an equivalent formula $\neg(p \leftrightarrow (q \to (r \vee p)))$ which does not contains any conditional ($\to$) and bi conditional ($\leftrightarrow$)

UNIT - II

4 In a Lattice (L, $\leq$) ,prove that $x \vee (y \wedge z) \leq (x \vee y) \wedge (x \vee z)$

OR

5 If ($A, \leq$) and ($B, \leq$) are posets, then prove that { $AxB, \leq$) } is a poset with partial order $\leq$ defined as (a, b) $\leq$(a b), if $a \leq a$ in A , if $b \leq b$ in B.

UNIT - III

6 State and prove Lagrange's theorem.

OR

7 Let ($S, *$) be a semi group, then prove that there exists a homomorphism $g : S \to S^S$ where <S^S, o> is a semi group of a function from S to S under the operation of the Composition.

UNIT - IV

8 (i) Use Mathematical induction show that $\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$

(ii) Using the generating function, solve the difference equation:

$$y_{n+2} - y_{n+1} - 6y_n = 0,\ y_1 = 1, y_0 = 2$$

OR

9 Solve the recurrence relation, S(n) = S(n-1)+2(n-1) with S(0) = 3, S(1) = 1 by finding its generating function.

UNIT - V

10 Prove that a simple graph has a spanning tree, iff it is connected.

OR

11 Define Eulerian graph. Show that a non empty connected graph is Eulerian if and only if all its vertices are of even degree.

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