Code: 13A05302 **R13**

B.Tech II Year I Semester (R13) Supplementary Examinations June 2015

DISCRETE MATHEMATICS

(Common to IT & CSE)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory question)

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

(a) Show that the propositions $p \to q \; and \; ⅂p \vee q$ are equivalent.

(b) State pigeonhole principal.

(c) When a lattice is said to be bounded?

(d) Prove that P, P $\to q$, $q \to r \Rightarrow r$.

(e) State Lagrange's theorem in δ group theory.

(f) Prove that the identity of a subgroup is same as that of the group.

(g) State any two properties of 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 spanning tree?

PART – B

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

UNIT - I

2 If n Pigeonholes are occupied by (kn+1) pigeons, where n is positive integer, prove that at least one Pigeonhole is occupied by k+1 or more Pigeons. Hence, find the minimum number of m integers to be selected from S = {1, 2, 3 ------9} so that the sum of two of the m integers are given.

(OR)

3 Show that $p \vee (q \wedge r) \; and \; (p \vee q) \wedge (p \vee r)$ are logically equivalent.

UNIT - II

4 In a Lattice (L, ≤), 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 $\{A \, xB, \leq)\}$ is a poset with partial order ≤ defined as (a, b) ≤ $(a \; b), if \; a \; \leq a \; in \; A, if \; b \leq b \; in \; B$.

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→ S^S Where $< S^S, 0 >$ is a semi group of a function from S to S under the operation of the composition.

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UNIT - IV

8 (a) Prove by mathematical induction, $3^{2n+1} + (-1)^n\, 2 = 0(Mod\ 3)$.

(b) Using the generating function, solve the difference equation
$y_{n+2} - y_{n+1} - 6y_n = 0,\ y_1 = 1, y_0 = 2.$

(OR)

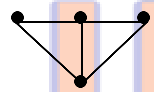
9 Solve the recurrence relation, S(n) = S(n-1) + 2 (n-1) with S(0) = 3, S(1) = 1 by finding its generating function.

UNIT - V

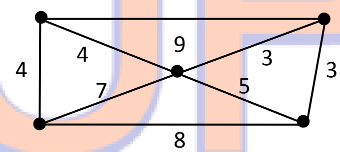
10 Define a planar graph, show that K_5 is non-planar.

(OR)

11 (a) Define spanning tree of a graph of G. Find all the spanning trees of a following graph



(b) Apply Kruskal's algorithm to find a minimal spanning tree of the following weighted graph.



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