Code: 13A05302 **R13**

B.Tech II Year I Semester (R13) Supplementary Examinations June 2016

DISCRETE MATHEMATICS

(Common to CSE and IT)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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

(a) What are basic logical operations? Define them.

(b) Find the minimum number of persons selected so that at least eight of them will have birthdays on the same day of week.

(c) Find the dual of the $wx(y'z + yz') + w'x'(y' + z)(y + z')$ of the Boolean expression.

(d) Define Lattices as algebraic system.

(e) State Lagrange's theorem.

(f) What is the coefficient of $x^3 y^2 z^2$ in $(x + y + z)^9$?

(g) State the principle of mathematical induction.

(h) Find the generating function of the sequence $a_n = n, n \geq m$.

(i) Find a chromatic number of a bipartite graph.

(j) Define Binary tree. Give an example.

PART – B

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

UNIT – I

2 Show that the arguments: (i) $p \xrightarrow{p} q$

$\therefore q$

(ii) $p \underset{p}{\rightarrow} q$

$\therefore q$ is valued.

OR

3 How many people among 200,000 are born at the same time (hour, minute, seconds)?

UNIT – II

4 (a) State and prove fundamental theorem on relations.

(b) Let $A = \{0,1,2,3,4\}$. Find the equivalence classes of the equivalence relation $R = \{(0,0),(0,4),(1,1),(1,3),(2,2),(3,1),(3,3),(4,0),(4,4)\}$ defined on A. Draw digraph of R and write down the partition of A induced by R.

OR

5 The direct product of any two distributive lattices is a distributive lattice.

UNIT – III

6 Let G be a group and let $Z = \{a: ax = xa \text{ for all } x \varepsilon G\}$ is a centre of the group G. Then prove that $'z'$ is a normal subgroup of G.

OR

7 A person writes letters to five friends and addresses on the corresponding envelops. In how many ways can the letters be placed in the envelops so that: (i) All the letters are in the wrong envelops. (ii) At least two of them are in the wrong envelops.

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UNIT – IV

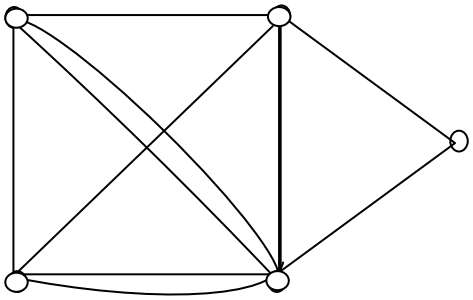
8 Prove $F_{m+n} = F_{m-1}F_n + F_mF_{n+1}$ for $m, n \geq 1$ by induction.

OR

9 Using Generating function solve the recurrence relation $a_n - a_{n-1} - 6a_{n-2} = 0$ given $a_0 = 2$, $a_1 = 1$.

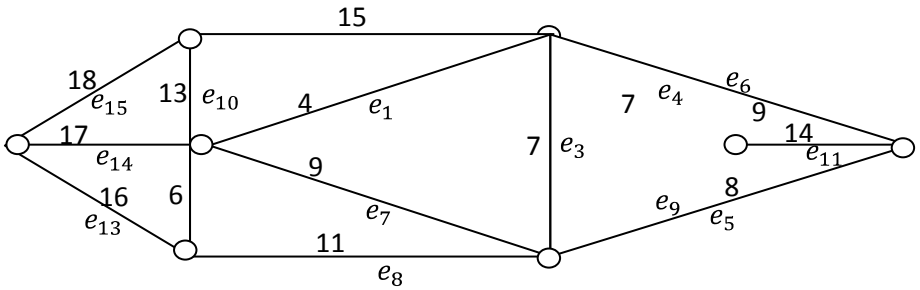
UNIT – V

10 Write an algorithm for getting an Euler line in Euler graph. Using this algorithm. Test whether the graph given has an Euler line or not?.



OR

11 Using Kruskal's algorithm, obtain a minimal tree for the graph given in below.



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