Code: 13A05302

R13

B.Tech II Year I Semester (R13) Regular & Supplementary Examinations December 2015

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) Show the following implication without constructing the truth table: $(P \to Q) \to Q \Rightarrow P \vee Q$

(b) State the pigeonhole principle.

(c) State the properties of lattices.

(d) Let (L, ≤) be a lattice and a, b, c ϵ L. Then prove a ∨ b = b iff a ≤ b

(e) In how many ways can 5 blue balls, 4 white balls and the rest 6 of different color balls be arranged in a row?

(f) Define semi group.

(g) What is the principle of mathematical induction?

(h) Define the following terms. Give one suitable example for each:
(i) Euler path. (ii) Euler circuit.

(i) Write about graph traversal techniques.

(j) Write about isomorphic graphs.

PART – B

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

UNIT – I

2 (a) Show that among any 4 numbers one can find 2 numbers so that their difference is divisible by 3

(b) Show that among any n+1 numbers one can find 2 numbers so that their difference is divisible by n

OR

3 (a) Let f: A _ R be defined by f(x) = (x-2) / (x-3), where A = R – {3}. Is the function of objective? Find f-1.

(b) Prove that (A-B) U (B-A) = (AUB) - (A_B) for any two sets A and B.

UNIT – II

4 Let (L,≤) be a lattice for any a,b,c € L . Prove that b ≤ c => a *b ≤ a* c => a Å b £ a Å c.

OR

5 (a) What is binary relation? Give properties of binary relation.

(b) Let P(A) be the power set of any non empty set A, then prove that the relation Í of set inclusion is not an equivalence relation.

UNIT – III

6 (a) Show that the set N of natural numbers is a semi group under the operation x * y = max {x, y}. Is it a monoid?

(b) Show that the set Z with binary operation * such that $x * y = x^y$ is not semi group.

OR

7 (a) In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels always come together?

(b) In how many ways can a team of 5 persons can be formed out of a total of 10 persons such that two particular persons should not be included in any team?

(c) In a birthday party, every person shakes hand with every other person. If there was a total of 28 handshakes in the party, how many persons were present in the party?

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UNIT – IV

8 (a) Suppose that m is a fixed integer and $x \equiv y \, mod \, m$. Then for every integer n > = 1, $x^n \equiv y^n \, mod \, m$. Prove this by mathematical induction

(b) Suppose that f(n) = n*f(n-1) with f(1) = 1. Prove by induction that f(n) = n*(n-1)…3*2*1.

OR

9 (a) Solve the Recurrence relation $a_n = a_{n-1} + 6 \, a_{n-2}$ given the initial conditions $a_0 = 3$ and $a_1 = 6$.

(b) Solve the recurrence relation $a_n = 7 a_{n-1} - 16 a_{n-2} + 12 a_{n-3} + n 4^n$, given $a_0 = -2$, $a_1 = 0$, $a_2 = 5$.

UNIT – V

10 (a) Explain Kruskal's algorithm with example.

(b) When it can be said that two graphs G1 and G2 are isomorphic?

OR

11 (a) Explain DFS algorithm with an example.

(b) Write about graph coloring.

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