PART-B

4 x 15 = 60M

UNIT-I

1. a. Obtain the PCNF of the formula **7M**
$(\neg P \rightarrow R) \wedge (Q \leftrightarrow P)$

   b. Using truth table show that **8M**
$(P \rightarrow Q) \wedge (R \rightarrow Q) \Leftrightarrow (P \vee R) \rightarrow Q$

(or)

2. a. Prove (or) disprove the validity of the following arguments **7M**
Lions are dangerous animals.
There are lions.
Hence, there are dangerous animals.

   b. Prove that $(\exists x)\ \{P(x) \wedge Q(x)\} \Rightarrow (\exists x)\ P(x) \wedge (\exists x)\ Q(x)$ **8M**

UNIT-II

3. a. Find the coefficient of X^{32} in $(1 + X^5 + X^9)^{10}$ **7M**

   b. In how many ways can 7 women and 3 men be arranged in a row if the 3 men must always stand next to each other? **8M**

(or)

4. a. Solve the recurrence relation $a_n - 9\,a_{n-1} + 26\,a_{n-2} - 24\,a_{n-3} = 0$, $n \geq 3$, $a_0 = 0$, $a_1 = 1$ and $a_2 = 10$ using generating functions. **8M**

   b. Find the number of non-negative integral solutions to **7M**
$x_1 + x_2 + x_3 + x_4 + x_5 = 50$

UNIT-III

5. a. Define partial ordering. Draw the Hasse diagram for poset $(A, \leq)$ with A = {2, 3,6,12, 24, 36} and R= {(x, y)/x and y $\in$ A and x $\leq$ y if x divides y}. **8M**

   b. If relations R and S are reflexive, symmetric and transitive, show that R $\cap$ S is also reflexive, symmetric and transitive. **7M**

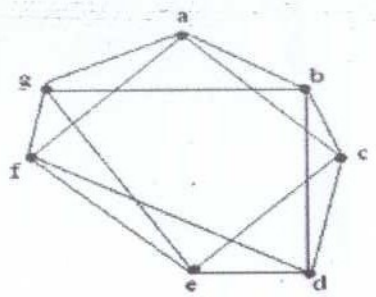
(or)

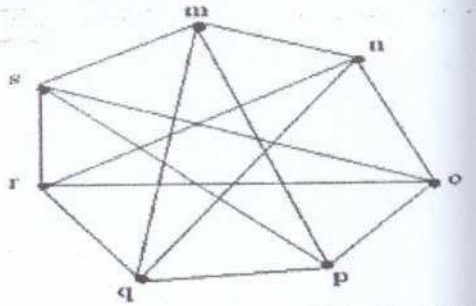
6. a. Let X = {1, 2, 3, 4, 5, 6} and R = {(x, y) | x>y}. Draw the digraph of R and also give its adjacency matrix. **7M**

   b. Let x = {1, 2, 3, 4, 5, 6, 7} and R={(x, y | x-y is divisible by 3}. Show that R is an equivalence relation and draw the graph of R. **8M**

UNIT-IV

7. a. Determine whether the following two graphs are isomorphic or not. If isomorphic, give one to one mapping. **8M**

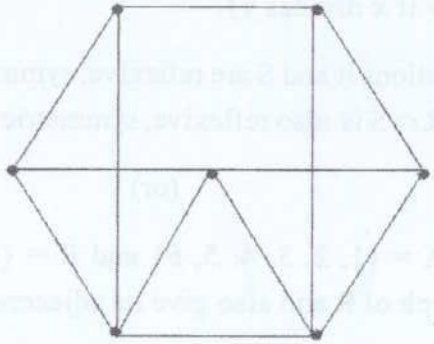




b. Write a brief note about the basic rules for constructing Hamiltonian graphs with suitable example. **7M**

(or)

8. a. Define chromatic number and find the chromatic number of the following graph. **8M**



b. Prove that if G is any connected graph for which each vertex has degree at least six, then G is not planar? **7M**

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CS/IT 3003

II/IV B.Tech. DEGREE EXAMINATION, DECEMBER, 2014

Third Semester

DISCRETE MATHEMATICAL STRUCTURES

Time: 3hours ***Max. Marks: 70***

Part-A is compulsory

Answer One Question from each Unit of Part-B

PART-A

10 x 1 = 10M

a. What is disjunctive normal form?

b. Define contradiction.

c. What is a predicate?

d. How many 5–letter words are there where the first and last letters are vowels?

e. Solve the recurrence relation $a_n = a_{n-1} + 3$, $a_1 = 2$ by substitution method.

f. Define equivalence relation.

g. Give an example of a relation which is neither reflexive nor irreflexive?

h. What is transitive closure?

i. Define complete graph with example.

j. What is multi graph?