b. How many different equivalence relations are there on a set with n elements for n = 1, 2, 3 and 4? **7M**

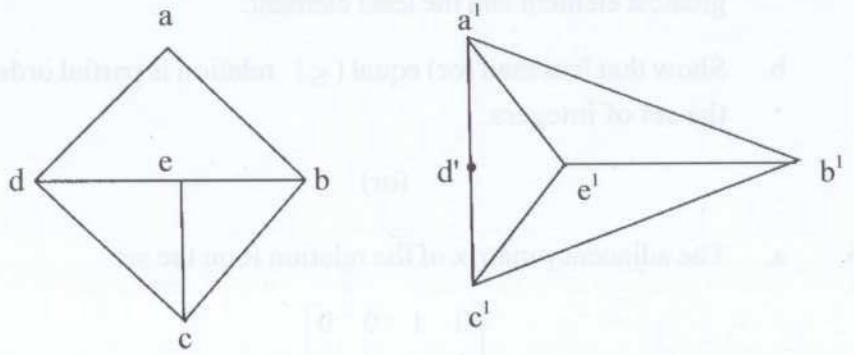
UNIT-IV

7. a. State and prove Eular's formula for a connected planer graph. **8M**

b. Use Grinberg's theorem to show that there is no planer Hamilton graph with regions of degree 5, 8 and 9 with exactly one region of degree 9. **7M**

(or)

8. a. Determine whether the following graphs are isomarphic (or) not. **8M**



b. Prove that a complete bipartite graph $K_{m,n}$ is planar iff $m \leq 2$ or $n \leq 2$. **7M**

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CS/IT 3003

II/IV B.Tech. DEGREE EXAMINATION, MAY, 2013

Third Semester

DISCRETE MATHEMATICAL STRUCTURES

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

Part-A is compulsory

Answer One Question from each unit of Part-B.

PART-A

10 x 1 = 10M

a. Define equivalence of two propositional functions.

b. State the rule of detachment used in logical infrence.

c. Give an example of a disjunctive normal form.

d. Find the number of ways of selecting 2 cards (without replacement) from a deck of 52 cards.

e. Solve the reccurrance relation $a_n = 2a_{n-1}$, $a_0 = 3$, $n \geq 1$

f. Define equivalence relation on a set.

g. Find the chromatic number of a cycle graph with n vertices.

h. Define adjacency matrix of a binary relation on a set.

i. If a non-directed graph contains 16 edges and all vertices are of degree 2, find the number of vertices.

j. Define an Euler path.

PART-B

4 x 15 = 60M

UNIT-I

1. a. Determine whether the following argument is valid (or) not **7M**

   If a baby is hungry, then the baby cries

   If the baby is not mad, then he does not cry

   If a baby is mad, then he has a red face

   Therefore, if a baby is hungry, then he has a red face

   b. Show that the propositions $p \rightarrow (q \vee r)$ and $\neg r \rightarrow (p \rightarrow q)$ are logically equivalent. **8M**

(or)

2. a. Give a direct proof for the following implication. **8M**

   'If two integers a and b have the same remainder when divided by a positive integer n then the integer a-b is divisible by n'

   b. Symbolize the following argument and check for its validity **7M**

   Every living thing is a plant (or) an animal

   David's dog is alive and it is not a plant

   All animals have hearts

   Hence David's dog has a heart

UNIT-II

3. a. How many integral solutions are there to $x_1 + x_2 + x_3 + x_4 + x_5 = 20$ where $x_1 \geq 3$, $x_2 \geq 2$, $x_3 \geq 4$, $x_4 \geq 6$ and $x_5 \geq 0$? **7M**

   b. Find the coefficient of x^{15} in **8M**

   $(x^2 + x^3 + x^4 + x^5)(x + x^2 + x^3 + x^4 + x^5 + x^6 + x^7)(1 + x + x^2 + \ldots + x^{15})$

(or)

4. a. Solve the recurrence relation for the fibonacci numbers

   $F_n = F_{n-1} + F_{n-2}$ for $n \geq 2$ and $F_0 = 1$, $F_1 = 1$ **7M**

   b. Solve the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 0$, for $n \geq 2$, $a_0 = 10$, $a_1 = 41$ using generating functions. **8M**

UNIT-III

5. a. Draw the Hasse diagram for the partial ordering $\{(A, B) / A \subseteq B\}$ on the power set P(S) where s = {a, b, c}, also determine the greatest element and the least element. **8M**

   b. Show that less than (or) equal ($\leq$) relation is partial ordering on the set of integers. **7M**

(or)

6. a. The adjacency matrix of the relation R on the set

   $A = \{a, b, c, d\}$ is $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$, then compute the adjacency matrix of R^+ using Warshall's algorithm. **8M**