Code No: OR210553 **OR**

II B.Tech I Semester Supplementary Examinations, May 2005
DISCRETE STRUCTURES & GRAPH THEORY
(Common to Computer Science & Engineering and Information Technology)

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

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain the Rules of inference.
   (b) Demonstrate that "R" is a varid inference from the premises P→ Q, Q→ R, and P.
2. (a) Prove that the relation "congruence modulo m " given by $\equiv = \{< x, y > /x - y$ is divisible by over the set of positive integers is an equivalence relation.
   (b) Let A be given finite set and ρ(A) its power set. Let $\subseteq$ be the inclusion relation on the elements of ρ(A). Draw Hasse diagram of $< \rho(A) \subseteq >$ for
      i. $A = \{a\}$
      ii. $A = \{a, b\}$
      iii. $A = \{a, b, c, d\}$
3. (a) If f : X→Y and g : Y→Z and both f and g are onto; show that g • f is also onto. Is g • f is one to one if both g and f are one to one? Justify.
   (b) Let D(x) denote the number of divisions of x. Show that D(x) is primitive recursive.
4. (a) Are the graphs given below isomorphic ? {As shown in the figure1}

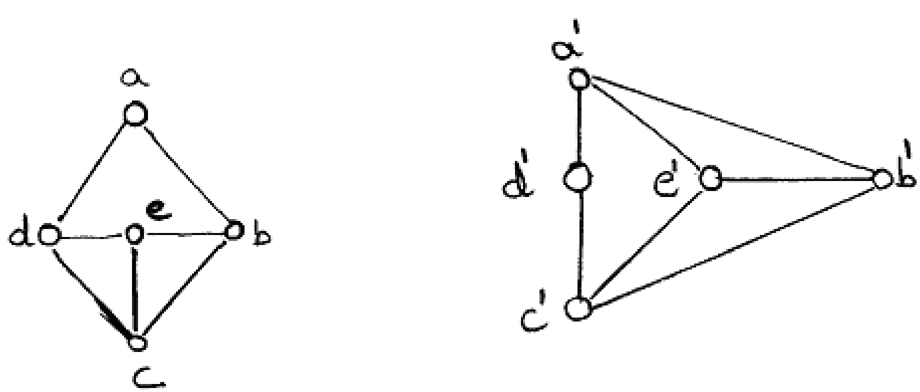

Figure 1:

   (b) Define isomorphism and give examples.
5. (a) Show that the following graph is Eulerian as shown in the figure2.
   (b) Verify the following graph is not Esulerian as shown in the figure3.

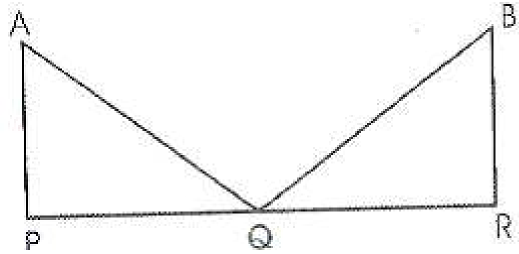

Figure 2:

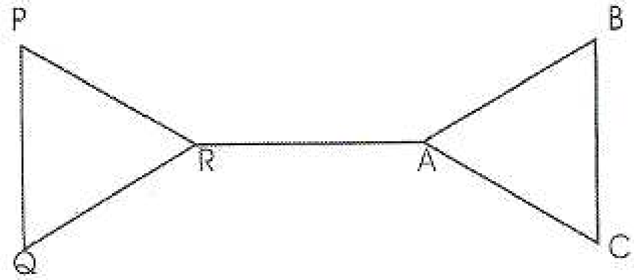

Figure 3:

(c) Prove that the complete bipartite graph $K_{2,3}$ is semi-Eulerian

6. (a) Write the algorithm for in order tree traversal . Give an example situation.

   (b) What are the areas of applications, where in order tree traversal can be implemented? Give at least four example situations.

7. (a) Explain the terms

      i. Disjunctive counting and

      ii. Sequential counting.

   (b) How many numbers can be formed using the digits 1, 3, 4, 5, 6, 8, and 9 if no repetitions are allowed?

8. Solve the recurrence relation $a_n - 8a_{n-1} + 21a_{n-2} - 18a_{n-3}=0$ for $n\geq 3$.

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