PVP 14

Code: CS3T1

II B.Tech - I Semester – Regular Examinations – December 2015

DISCRETE MATHEMATICS
(COMPUTER SCIENCE AND ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11x 2 = 22 M

1. a) Using the statements : R: John is Healthy
   H: John is clever
   Write the following statements in symbolic form
   i) If John is healthy then he is not clever
   ii) John is not healthy but clever.

   b) Construct the truth table for $\neg(\neg P \wedge \neg Q)$.

   c) Show that $(x)(H(x) \rightarrow M(x)) \wedge H(s) \Rightarrow M(s)$.

   d) Prove that in a lattice $(L, \leq)$, $a \leq b$ if and only if $a \wedge b = a$.

   e) Give an example of a lattice which is distributive but not complemented.

   f) If the universe of discourse is $\{a, b, c\}$ eliminate the quantifier from the formula $(x)(P(x))$.

   g) Define Isomorphism of two graphs.

   h) State Euler's formula for planar Graphs.

   i) Is there a graph with degree sequence (1, 3, 3, 3, 5, 6, 6)? Give reasons.

j) Show that any nontrivial tree contains at least two vertices of degree 1.

k) Describe the problem of Konigsberg Seven bridges and draw its graph.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks. 3 x 16 = 48 M

2. a) Show that $((P \vee Q) \wedge \neg(\neg P \wedge (\neg Q \vee \neg R))) \vee (\neg P \wedge \neg Q) \vee (\neg P \wedge \neg R)$ is a tautology. 8 M

b) Prove that 8 M

$$\neg (p \rightleftarrows q) \Leftrightarrow (p \vee q) \wedge \neg (p \wedge q)$$

3. a) Show that $(\forall x)(p(x) \vee q(x)) \Rightarrow (\forall x) p(x) \vee (\exists x)\, q(x)$. 8 M

b) Show that $r \wedge (p \vee q)$ is a valid conclusion from the premises $p \vee q$, $q \rightarrow r$, $p \rightarrow m$ and $\neg m$. 8 M

4. a) Show that in a lattice $\langle L, \leq \rangle$ if $a \leq b \leq c$ then 8 M

i) $(a \vee b) = (b \wedge c)$.

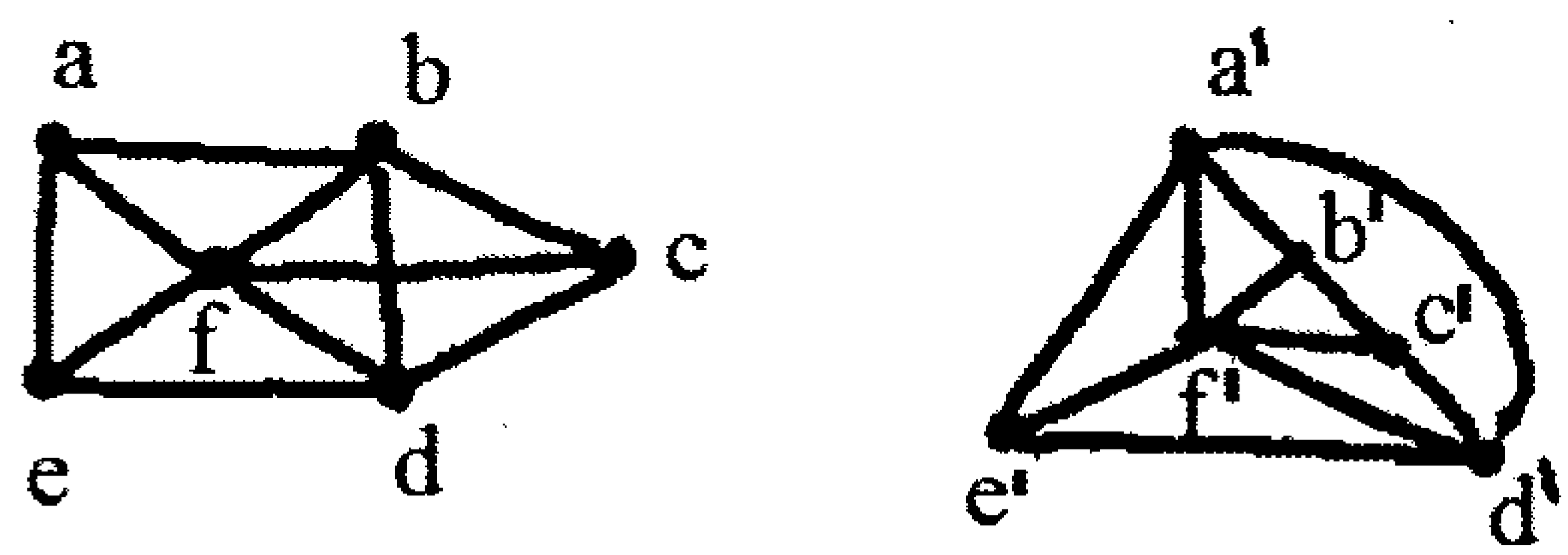
ii) $(a \wedge b) \vee (b \wedge c) = b = (a \vee b) \wedge (a \vee c)$

b) i) Prove that every chain is a distributive lattice

ii) Show that every interval of a lattice is sub lattice

8 M

5. a) Are the following pair of graphs isomorphic. Justify your answer. 8 M



b) Prove that every tree with n vertices has exactly $(n-1)$ edges. 8 M

6. a) Prove that a complete graph K_n is planar iff $n \leq 4$. 8 M

b) In a connected simple planar graph show that $|E| \leq 3|V|-6$

8 M