

Code: CSCS1T2

I M.Tech-I Semester-Regular Examinations-April 2013

**MATHEMATICAL FOUNDATIONS OF COMPUTER
SCIENCE
(COMPUTER SCIENCE & ENGINEERING)**

Duration: 3 hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1 (a) Construct the truth table for each of these compound propositions.

i) $(P \vee Q) \rightarrow (P \leftrightarrow Q)$ ii) $(P \vee Q) \leftrightarrow (P \wedge Q)$. 7 M

(b) Obtain DNF for

i) $P \wedge (P \rightarrow Q)$ ii) $(P \rightarrow Q) \wedge (\sim P \wedge Q)$ 7 M

2 (a) Show that $S \vee R$ is tautologically implied by

$(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$. 7 M

(b) Express the following statements using quantifiers, Variables and predicates symbols.

i) All birds can fly

ii) Some men are not giants 7M

3 (a) Draw the Hasse diagram for divisibility on the set $\{1,2,3,6,12,24,36,48\}$

7 M

(b) Let $A=\{a,b,c\}$, $B=\{x, y\}$ and $C=\{0, 1\}$.

Find i) $A \times B \times C$ ii) $C \times B \times A$

iii) $C \times A \times B$ iv) $B \times B \times B$

7 M

4 (a) Show that a group $(G,*)$ is abelian if and only iff
 $(a*b)^2 = a^2 * b^2$ for $a,b \in G$

7 M

(b) What are the properties of a group

3 M

(c) Explain about Homomorphism

4 M

5 (a) What are the two basic counting principles? How many different license plates are there that involve 1, 2 or 3 letters followed by 4 digits?

7 M

(b) What is the coefficient of $x^{101} y^{99}$ in the expansion of $(2x - 3y)^{200}$?

7 M

6 (a) Solve the Fibonacci recurrence relation

$$F_n = F_{n-1} + F_{n-2}, F_1 = F_2 = 1$$

7 M

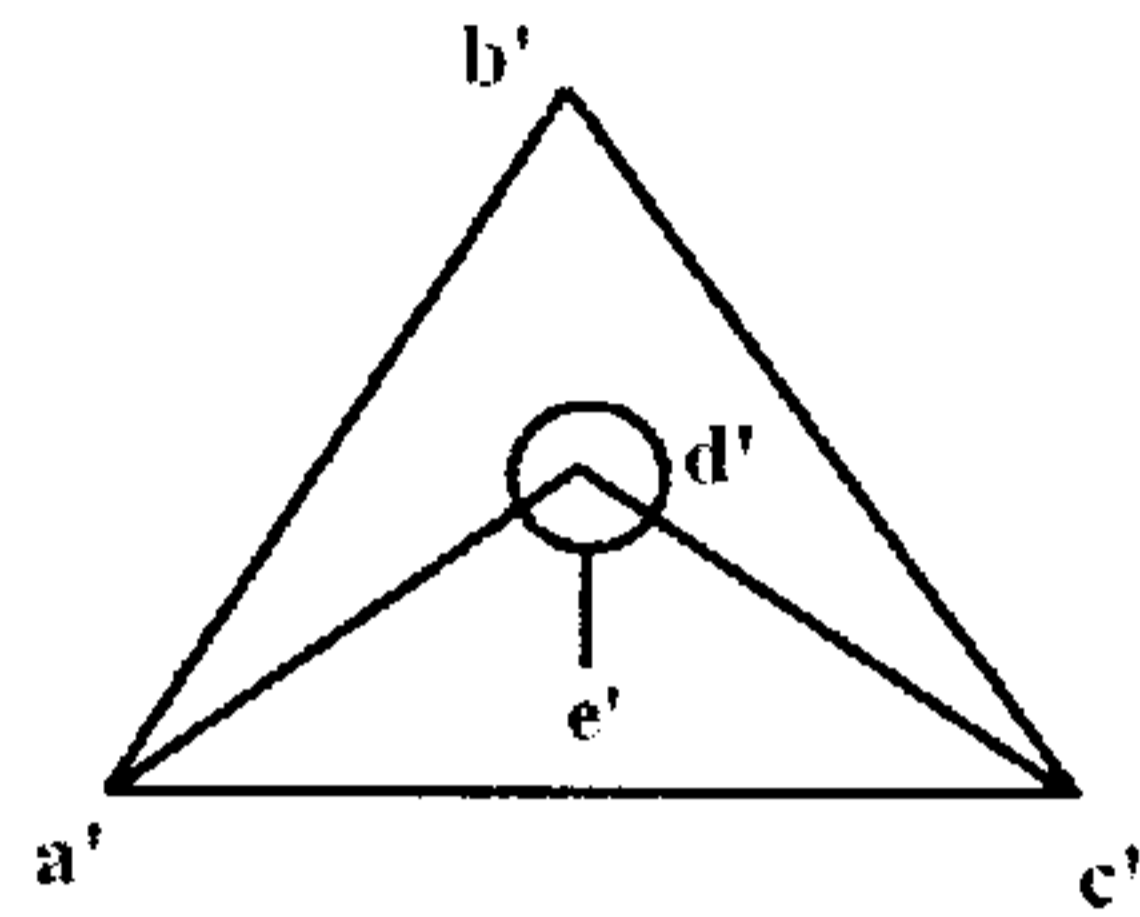
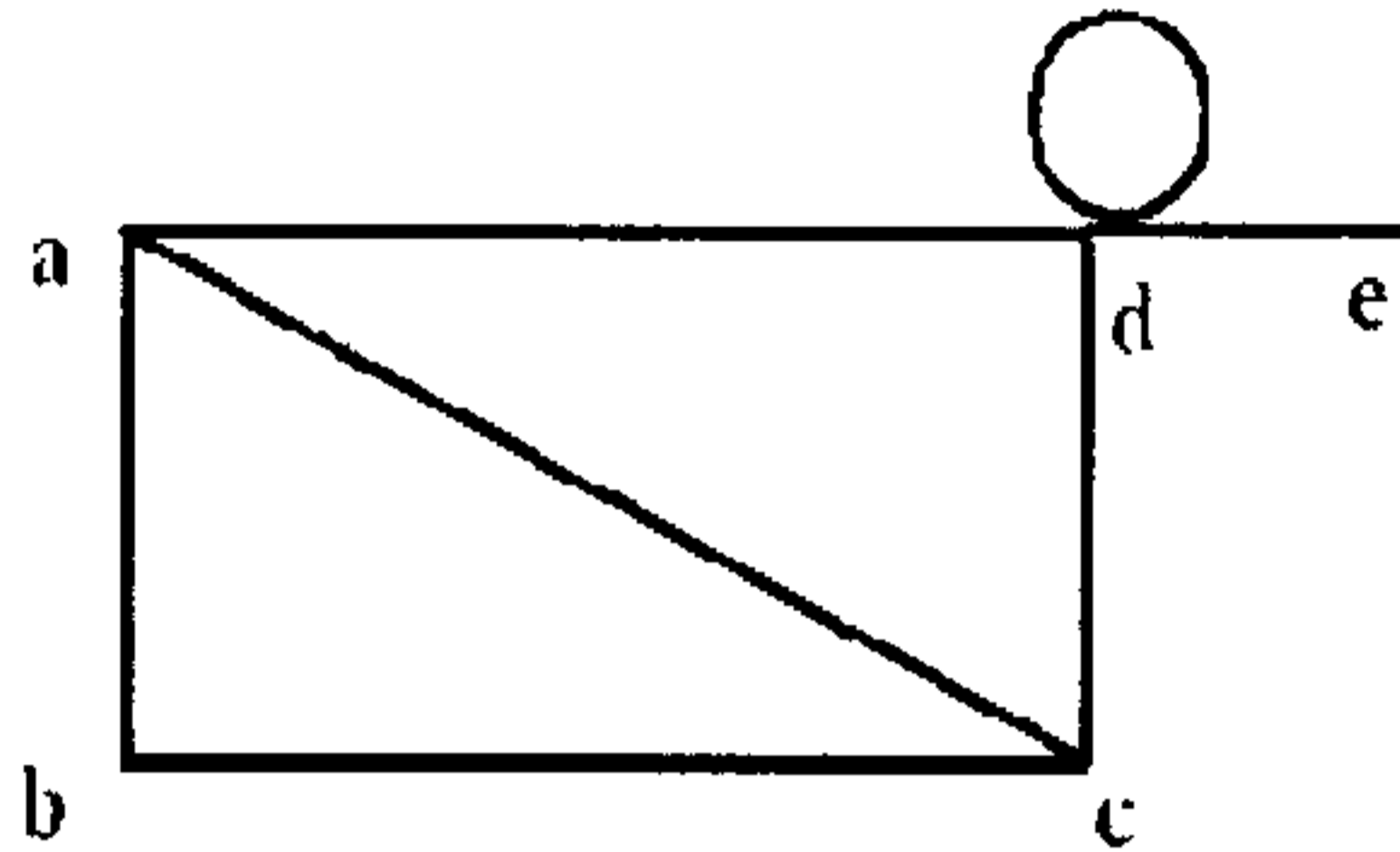
(b) Solve the recurrence relation

$$a_n - 7a_{n-1} + 16a_{n-2} - 12a_{n-3} = 0 \text{ for } n \geq 3$$

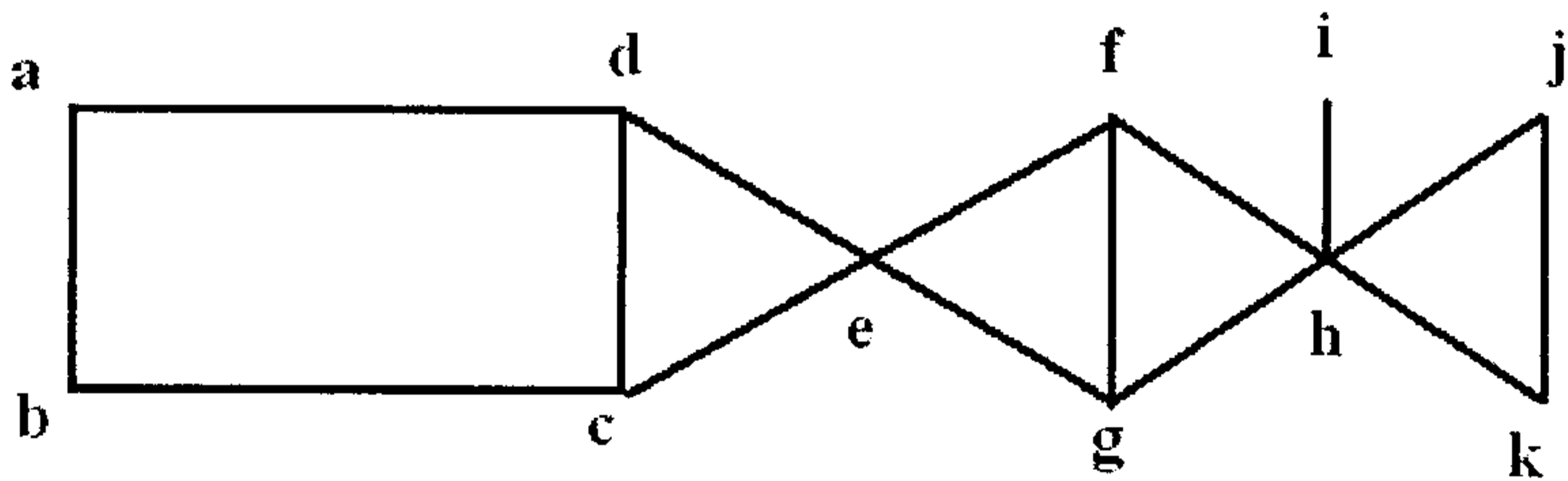
with the initial conditions $a_0 = 1$, $a_1 = 4$ and $a_2 = 8$.

7 M

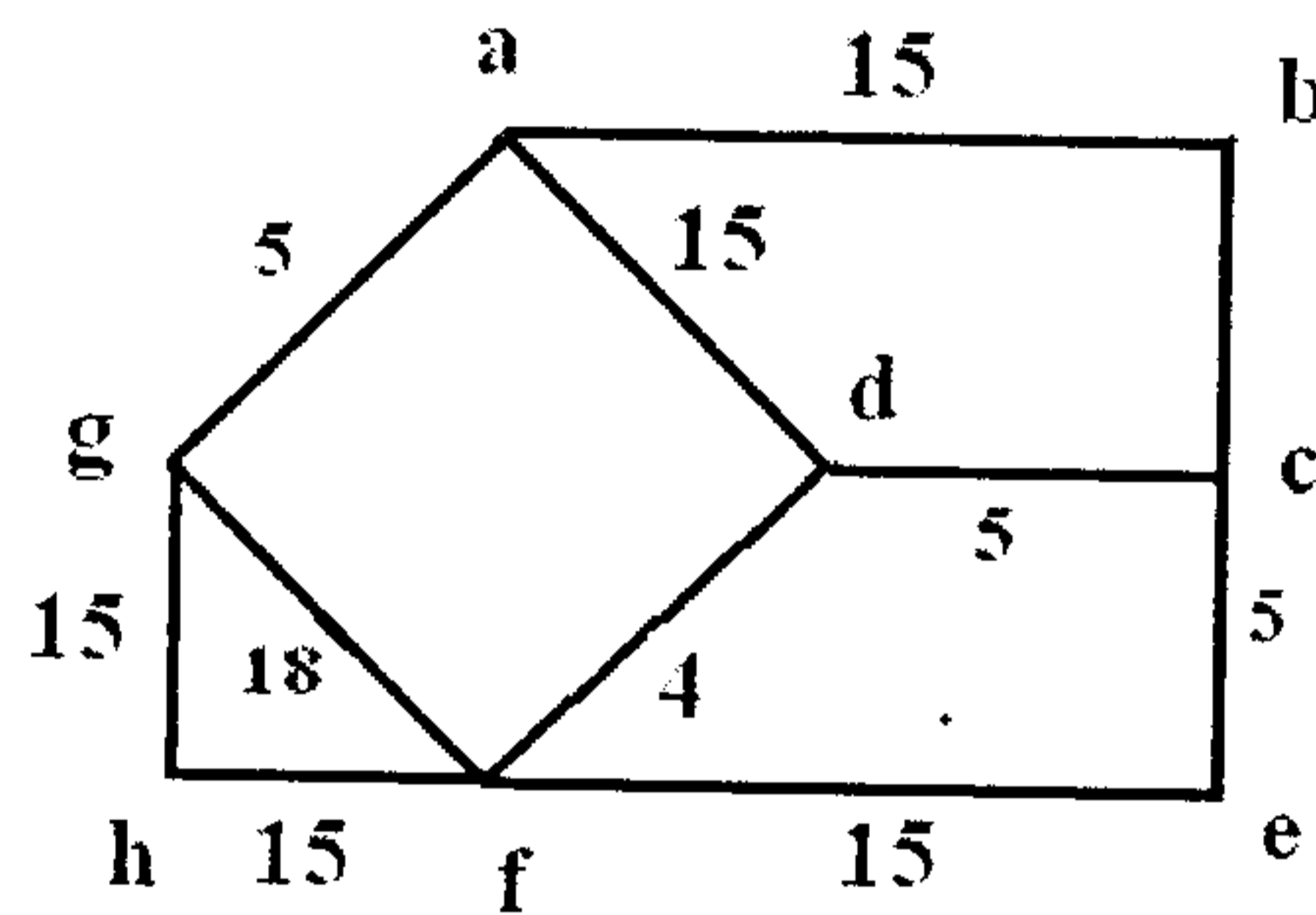
7 a) Determine whether the given pair of graphs is isomorphic. Justify your answer. 7 M



b) What is spanning tree? Obtain the spanning tree for the following graph by using BFS algorithm 7 M



- 8 a) Write Prim's algorithm and find a minimum spanning tree in the graph shown below. 8 M



- b) What are the various techniques of tree traversal and explain them with example. 6 M