

Code: CSCS1T2

I M.Tech-I Semester-Regular Examinations-March 2014**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) Show that $P \vee (Q \wedge R)$ and $(P \vee Q) \wedge (P \vee R)$ are logically equivalent. 7 M
- b) Obtain PDNF for the formula $P \vee (\sim p \wedge \sim Q \wedge R)$. 7 M
- 2 a) Show that $R \rightarrow S$ can be derived from premises $P \rightarrow (Q \rightarrow S)$, $\sim R \vee P$, Q 8 M
- b) What is quantifier? Explain with suitable examples 6 M
- 3 a) Let the computability relation on the set $S = \{ \text{ball, bed, let, egg} \}$ be given by the relation $R = \{ (x,y) / x,y \in S \text{ and } xRy \text{ if } x \text{ and } y \text{ contain some common letter} \}$. Write the relation matrix, draw the graph for relation R . 7 M
- b) Draw the Hasse diagram for the “subset” relation on set $P = \text{power set of } S$, where $S = \{a,b,c\}$. 7 M

4 a) Let G is a group. Show that the function $f : G \rightarrow G$ defined by $f(a) = a^{-1}$ is an isomorphism if and only if G is abelian 8 M

b) Define the following with examples.
Group , Semi group, Cyclic group and Abelian group . 6 M

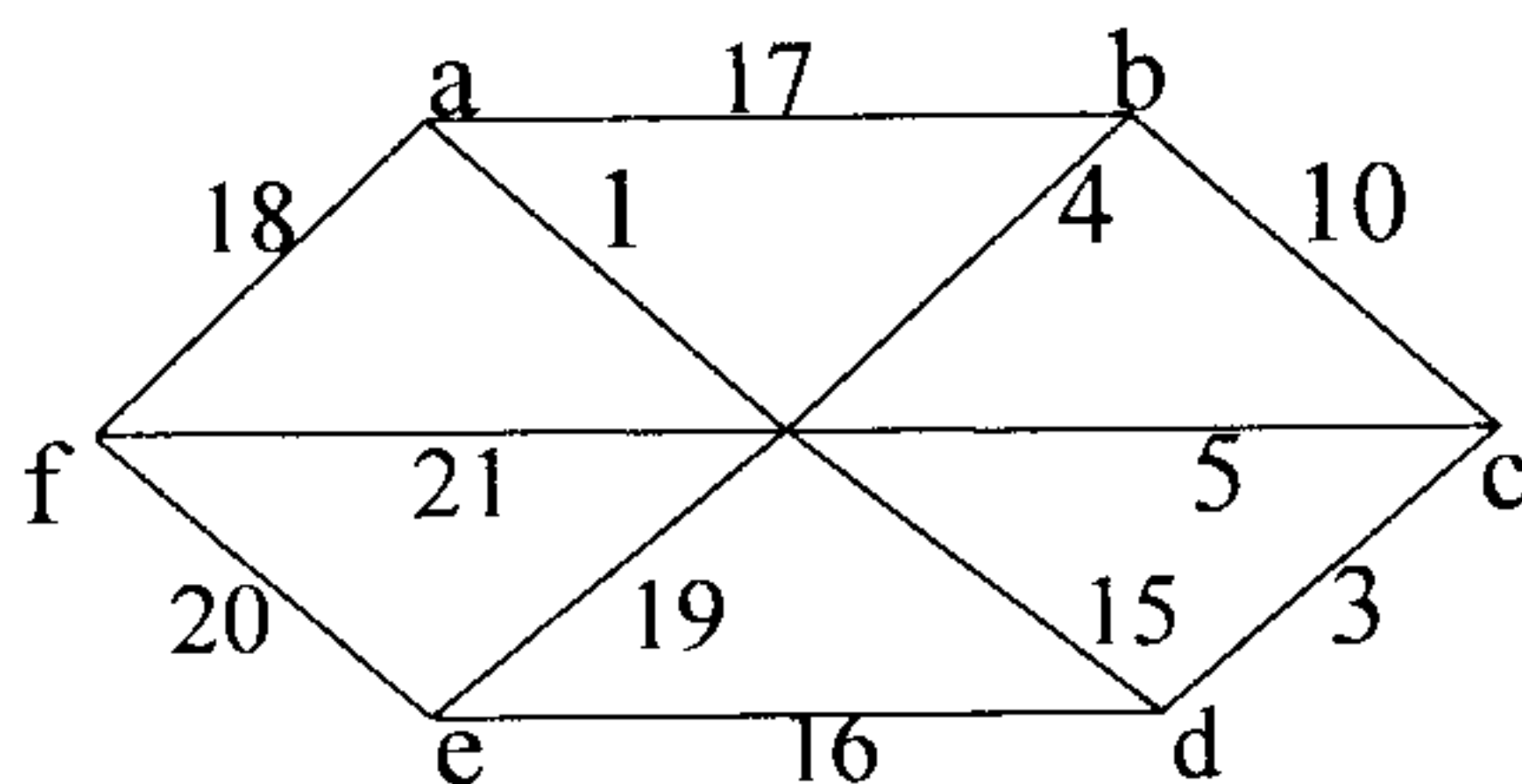
5 a) Compute the number of integers between 1 and 1000 that are not divisible by 2,3,5 or 7 ? 7 M

b) Explain the principle of inclusion-exclusion. Suppose that 200 faculty members can speak French and 50 can speak Russian while only 20 can speak both French and Russian. How many faculty members can speak either French or Russian? 7 M

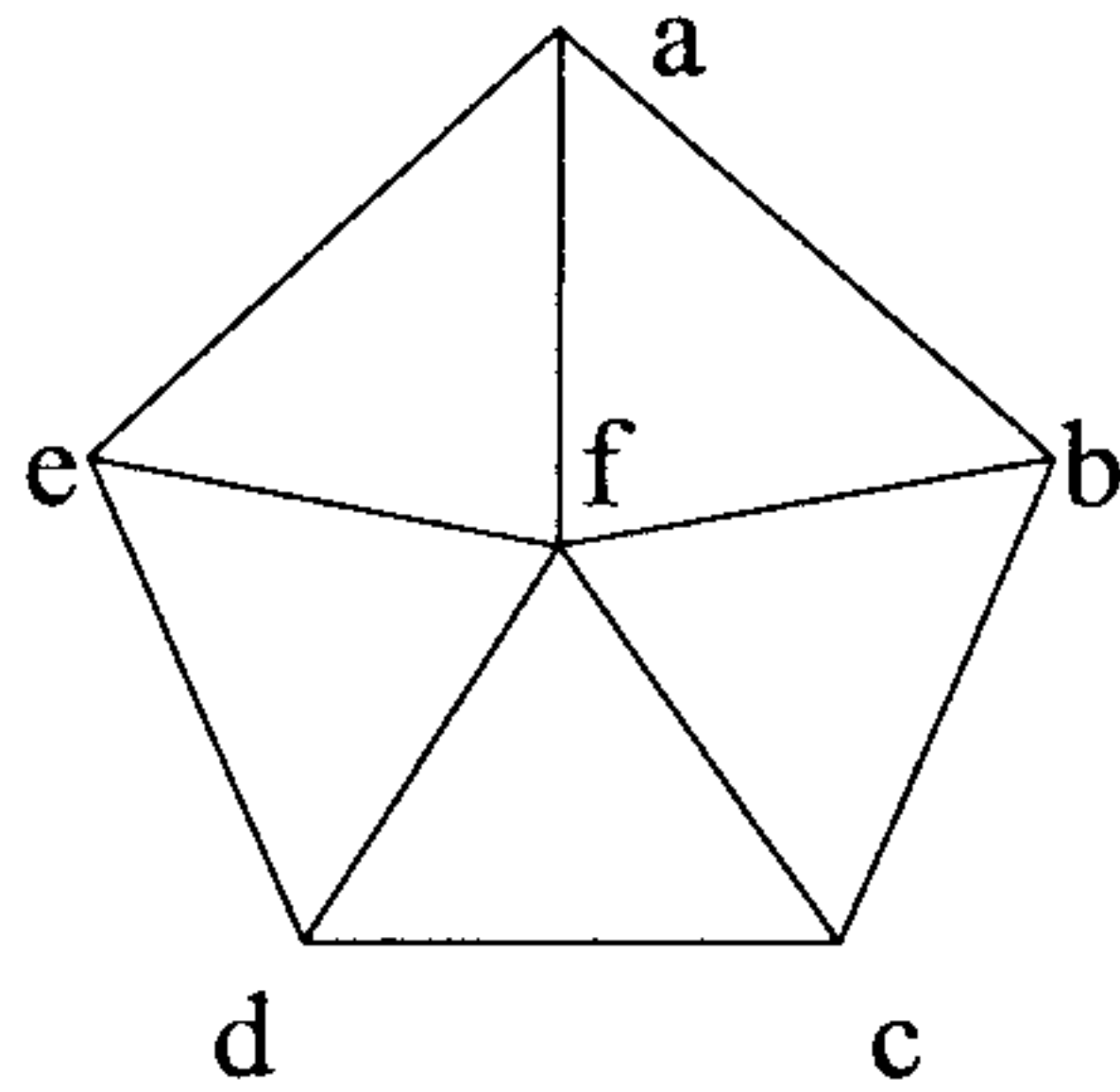
6 a) Solve the recurrence relation $a_n + a_{n-1} - 5a_{n-2} + 3a_{n-3} = 0$ where $a_0 = 0$, $a_1=1$ and $a_2=2$. 7 M

b) Solve $a_n - 6a_{n-1} + 12 a_{n-2} - 8 a_{n-3} = 0$ by generating functions. 7 M

7 a) What is minimal spanning tree? Explain how Kruskal's algorithm find a minimal spanning tree. Find minimal spanning tree for the following graph using Kruskal's algorithm. 7 M



- b) Determine chromatic numbers. Find the chromatic number for the following graph. 7 M



- 8 a) What is Hamiltonian cycle? What are the basic rules for constructing Hamiltonian paths and cycles. 7 M
- b) Explain about planar graphs and Euler circuits. 7 M