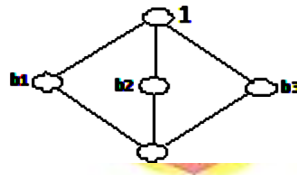


Answer any FIVE questions
All questions carry equal marks

1. (a) Obtain principal conjunctive normal form for,
 $(\neg P \rightarrow Q) \wedge (Q \Leftrightarrow P)$
(b) Show the following implication without using truth table.
 - i. $P \rightarrow Q \Rightarrow P \rightarrow (P \wedge Q)$
 - ii. $(P \rightarrow Q) \rightarrow Q \Rightarrow (P \vee Q)$
2. (a) Explain the concept of free and bound variables for predicate calculus with examples.
(b) Show that $(x)(P(x) \rightarrow Q(x)) \wedge (x)(Q(x) \rightarrow R(x)) \Rightarrow (x)(P(x) \rightarrow R(x))$
3. (a) Define a poset. Let $X = \{2, 3, 6, 8\}$ and let \leq be the relation "divides" on X . Prove that $\langle X, \leq \rangle$ is a poset.
(b) Define a lattice. Show that the following lattice is not distributive.



4. (a) Explain any six properties of an algebraic system.
(b) With an example, explain the concept of homomorphism and isomorphism.
5. (a) If A and B are subsets of some universe set U , then $|A \cup B| = |A| + |B| - |A \cap B|$
(b) Explain the pigeon hole principle and any two applications of it.
6. Solve the recurrence relation.
 $a_n - 7.a_{n-1} + 10.a_{n-2} = 0$ for $n \geq 2$
7. (a) Explain different representations of graphs.
(b) What is a planar graph? Explain with an example.
8. (a) When do you say that two graphs are isomorphic? Give two graphs and prove that they are isomorphic.
(b) What is a chromatic number of a given graph? With an example, explain the process of computing chromatic number of a given graph.
