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MCA I Semester Regular & Supplementary February 2014 Examinations

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(For 2009, 2010, 2011, 2012 & 2013 admitted batches only)

Time: 3 hours Max. Marks: 60

Answer any FIVE questions
All questions carry equal marks
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1 (a) Obtain PCNF of $(\neg P \rightarrow R) \wedge (Q \rightleftarrows P)$.
(b) State the laws of algebra of propositions.

2 (a) Check whether the following arguments are valid or not.
No professors are ignored
All ignorant people are vain
Hence, no professors are vain.
(b) What is predicate logic? Explain free and bound variables with example.

3 (a) Prove that "A relation on a set A is reflexive if and only if the inverse relation R^{-1} is reflexive".
(b) What is a lattice? Explain the properties of lattice.

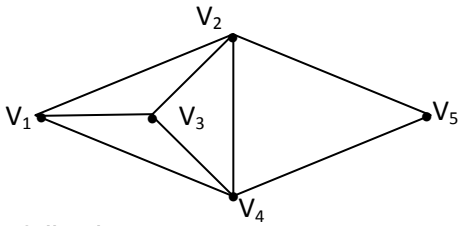
4 (a) Prove that the intersection of two submonoids of a monoid is a monoid.
(b) State and explain the four axioms of a group. With an example, explain about a group.

5 (a) How many integers between 10^5 and 10^6
(i) Have no digits other than 2, 5, 8?
(ii) Have no digits other than 0, 2, 5 or 8?
(b) Explain the principle of inclusion-exclusion for n sets.

6 (a) Solve the recurrence relation $a_n = na_{n-1}$ for $n \geq 1$, given that $a_0 = 1$.
(b) Write the working procedure for solving non-homogeneous finite order relations.

7 (a) Prove that the sum of degrees of the regions of a planar graph G is equal to twice the number of edges in G.
(b) Define a graph. Explain various types of graphs with example.

8 (a) Find the chromatic number of the graph.



(b) Prove the following:
(i) A path with n vertices is of length n-1.
(ii) If a cycle has 'n' vertices, it has 'n' edges.
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