Code: 9A05301

R09

B.Tech II Year I Semester (R09) Supplementary Examinations December 2015

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSE, IT & CSS)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Show that the proposition (p v ~ q) ^ (~ p v ~ q) v q is a tautology.
(b) Show that ((p → q) → p) → p is a tautology.
(c) Show that (~ p ^ (~ q ^ r)) v (q ^ r) ^ (p ^ r)≡ r .

2 Show that r v s follows logically from premises:
c v d , (c v d) → ~ b, ~b → (a ^ ~b) and (a ^ ~b) → r v s.

3 Let A = {a, b, c, d} and R be a relation on A that has the matrix MR = $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$. Construct a digraph of R and list the in-degree & out degree of all vertices.

4 (a) Prove that the group < Z_4, +> is cyclic find all its generators.
(b) Prove that “Every cyclic is abelian, but the converse is not true”.

5 (a) Solve the recurrence relation using generating function a_n-5a_{n-1} + 6a_{n-2} = 4^{n-2} for n ≥ 2 and a_0 = 1, a_1 = 5.
(b) Find the coefficient of x^5 in $(1-6x)^{-7}$.

6 Determine the number of subsets of a set with n elements.

7 (a) Write down the Euler formula for planar graph.
(b) Prove that for any connected planar graph, v-e+r = 2.

8 (a) Draw the complete graph with 7 vertices.
(b) Show that two simple graphs are isomorphic if and only if their complements are also isomorphic.

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