R09

Code: 9A05301

B.Tech II Year I Semester (R09) Supplementary Examinations June 2017
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSS, IT & CSE)

Time: 3 hours   Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Construct the truth table for the formula
$\sim (p \vee (q \wedge r)) \leftrightarrow ((p \vee q) \wedge (p \vee r))$
   (b) Prove by contradiction
$\sim p \leftrightarrow q$, $q \to r$, $\sim r$, therefore p

2   Show that:
For all (x) (p(x) $\vee$ q (x)) $\Rightarrow$ for all (x) p(x) $\vee$ there exists x q(x)
By indirect method of proof.

3   Let (L,$\leq$) be a lattice for any a, b, c $\in$ L show that:
$b \leq c \Rightarrow a * b \leq a * c$ &
$b \leq c \Rightarrow a \circledR b \leq a \circledR c$

4 (a) Let G be the set of all non-zero real numbers and let $a * b = \frac{1}{2} ab$. Show that <G,*> is an abelian group.
   (b) Prove for any elements a,b in a group G, we have:
(i) $(a^{-1})^{-1} = a$
(ii) $(ab)^{-1} = b^{-1}a^{-1}$

5 (a) Solve the recurrence relation using characteristic roots $a_n - 5a_{n-10} + 8a_{n-2} = 3^n$, for $n \geq 2$.
   (b) Find the coefficient of x^5 in $(1-4x)^{-7}$.

6   A farmer buys 3 cows, 8 buffalos and 12 chickens from a man who has 9 cows, 25 buffalos and 100 chickens. How many choices does the farmer have?

7 (a) Explain the adjacency matrix representation of a graph with an example.
   (b) Prove that a connected graph of n vertices and m edges has n-1 branches and m-n+1 chord.

8 (a) Prove that for any graph *G*, the sum of the degrees of the vertices of *G* is twice the number of edges.
   (b) Find the number of simple graphs up to 3 nodes.
   (c) Prove that all planar graphs are 5-colourable.

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