Code No: NR210501 **NR**

II B.Tech I Semester Supplementary Examinations, November 2006
DISCRETE STRUCTURES & GRAPH THEORY
(Common to Computer Science & Engineering, Information Technology and Electronics & Computer Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Without constructing the truth table find whether $A\wedge$ is valid or not for the following. [8+8]
$A \rightleftarrows B$, $B \rightleftarrows (C \wedge D)\, C \rightleftarrows\ (A \vee E)$ *and* $A \vee E$.
   (b) Establish the validity of $A\vee C$ from $A\rightleftarrows (B \rightarrow C)$, $B\rightleftarrows(\neg A\vee\neg\, C)$, $C\rightleftarrows(A\vee\neg\, B)$ and B.

2. (a) Let the compatibility relation on a set $\{x_1, x_2, ...x_6\}$ be given by the following matrix. Draw the graph and find the maximal compatibility blocks of the relation. [8+8]

X_2	1				
X_3	1	1			
X_4	0	0	1		
X_5	0	0	1	1	
X_6	1	0	1	0	1
	X_1	X_2	X_3	X_4	X_5

   (b) Let R denote a relation on the set of ordered pairs of positive integers such that $< x, y > R < u, v >$ if and only if xv = yu. Show that R is an equivalence relation.

3. (a) Let L be lattice. Then prove that a ∧ b = a if and only if a ∨ b = b. [8+8]
   (b) Define the dual of a statement in a lattice L.Why does the principle apply to L?

4. (a) Let d_m and d_M demote the minimum and maximum degrees of all the vertices of G(V,E), respectively. Show that, for a non directed graph G, $d_m \leq 2.|E|/|v| \leq d_M$ [8+8]
   (b) Suppose that G is a non directed graph with 12 edges. Suppose that G has 6 vertices of degree 3 and the rest have degrees less than 3. Determine the minimum number of vertices, G can have.

5. (a) Define Euler line and Euler graph with two examples [6]
   (b) Prove that connected graph G is an Euler graph if and only if, the all vertices of G are of even degree. [10]

6. (a) Prove that a binary tree with n nodes has exactly n+1 null branches. [8+8]
   (b) Formulate an algorithm for the in order traversal of a binary tree.

7. (a) Compute the number of rows of 6 Americans, 7 Mexicans, and 10 Canadians in which an American invariably stands between a Mexican and a Canadian and in which a Mexican and a Canadian never stand side by side.

   (b) In how many ways can we choose 3 of the numbers from 1 to 100. So that their sum is divisible by 3 ? [8+8]

8. Solve the recurrence relation [16]
   T(k) + 3 kT(k-1) = 0, T(0) = 1

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