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Code No: MA1506

GEC-R14

II B. Tech I Semester Supplementary Examinations, June 2017

**DISCRETE MATHEMATICAL STRUCTURES**

(Common to Computer Science and Engineering  
and Information Technology)

Time: 3 Hours

Max. Marks: 60

**Note:** All Questions from **PART-A** are to be answered at one place.

Answer any **FOUR** questions from **Part-B**. All Questions carry equal Marks.

**PART-A**

**6 × 2 = 12M**

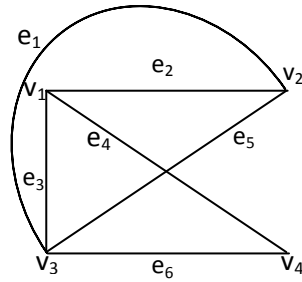
1. Construct the Truth table for  $p \text{ iff } \sim q$ .
2. Define primitive recursive function.
3. Define semi-group and monoid.
4. Define bipartite graph and k-regular graph.
5. Find the chromatic number of  $K_n$  and a wheel graph with 4 vertices.
6. Solve the Recurrence Relation  $u_n - 7u_{n-1} + 10u_{n-2} = 0$ .

**PART-B**

**4 × 12 = 48M**

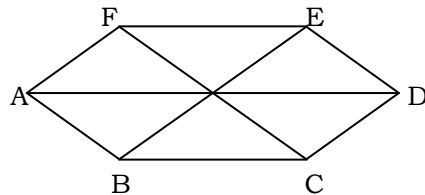
1. a) Show that  $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow [p \rightarrow r]$  is a tautology. (6M)  
b) Show that  $\sim p$  follows from the premises  $p \rightarrow q$ ,  $r \rightarrow \sim q$  and  $r$ . (6M)
2. a) Let  $X = \{1, 2, \dots, 9\}$  and  $R = \{(x, y) / (x-y) \text{ is divisible by } 5\}$ . Show that  $R$  is an equivalence relation. (6M)  
b) Let  $A = \{a, b, c\}$ . Draw the Hasse diagram of the partially ordered set  $(P(A), \subseteq)$ , where  $P(A)$  denotes the power set of  $A$ . (6M)
3. a) Show that the cube roots of unity forms a group under usual multiplication and find out inverse of each element. (6M)  
b) Show that the identity element in a group is unique. (6M)

4. a) Find the Euler path to the following graph. (6M)



- b) Draw the graph whose adjacency matrix is given by  $A = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$  and find the degrees of the vertices. (6M)

5. Find the chromatic number and a spanning tree of the following graph. (12M)



6. Solve the Recurrence Relation  $a_n + 3a_{n-1} - 10a_{n-2} = n^2 + n + 1$ . (12M)

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