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Code No: MA1506

GEC-R14

II B. Tech I Semester Regular Examinations, November 2016

**DISCRETE MATHEMATICAL STRUCTURES**

(Common to Computer Science and Engineering &  
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. Negate the proposition “If the processor is fast then the printer is slow”.
2. If  $f: \mathbb{R} \rightarrow \mathbb{R}$  and  $g: \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = 2x + 1$  and  $g(x) = x/3$  find  $(g \circ f)^{-1}(x)$ , where  $\mathbb{R}$  denotes the set of real numbers.
3. Define an algebraic structure and give an example.
4. Write the no. of edges in  $K_n$  and  $K_{m,n}$ .
5. Define Hamiltonian Graph.
6. Solve the Recurrence Relation  $a_n - 7a_{n-1} + 12a_{n-2} = 0$ , for  $\forall n \geq 2$ .

**PART-B**

**4 × 12 = 48M**

1. a) Obtain the sum of products canonical form (PDNF) for the formula  $(p \wedge q) \vee (\neg p \wedge r) \vee (q \wedge r)$ . (6M)  
b) Are the propositional functions  $p \rightarrow (q \rightarrow r)$  and  $(p \rightarrow q) \rightarrow r$  logically equivalent? Justify your answer? (6M)
2. a) Prove that the relation “congruence modulo m” is an equivalence relation in the set of integers. (6M)  
b) Define partial order relation. Prove that the relation ‘ $\subseteq$ ’ of set inclusion is a partial order one on  $P(A)$ , the power set of the set  $A = \{a, b, c\}$ . Draw the Hasse diagram for this relation. (6M)
3. a) Prove that the set  $G = \{0, 1, 2, 3, 4\}$  forms a finite abelian group of order 5 under the composition as addition modulo 5. (6M)  
b) In the set of integers  $Z - \{1\}$ , show that the operation ‘0’ defined by  $a \circ b = a + b - ab$ , for all  $a, b \in Z - \{1\}$  forms an infinite abelian Group. (6M)
4. a) when it can be said that two graphs  $G_1$  and  $G_2$  are isomorphic? How can it be discovered? Explain with example. (6M)

- b) Define the following with example.  
 (i) Euler path (ii) Euler circuit (iii) Eulerian Graph (6M)
5. a) What is Hamiltonian cycle? Discuss the Hamiltonian cycle in  $K_5$ . (6M)
- b) Find the chromatic number of the following Graphs (6M)  
 (i)  $K_{3,3}$  (ii) Tree (iii)  $W_5$
6. a) Solve the Recurrence Relation  $a_n - 6a_{n-1} + 8a_{n-2} = 9$ ,  $\forall n \geq 2$ , with initial conditions  $a_0 = 10$  and  $a_1 = 25$ . (6M)
- b) Solve the Recurrence Relation  $a_n = a_{n-1} + n(n-1)$ , for  $n \geq 1$ , by substitution method, given  $a_0 = 1$ . (6M)

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