Philadelphia University Faculty of Engineering Department of Computer Engineering		Date:- 07/01/2015 Allowed time:- 60 minutes

Discrete Mathematics (630260) **Second Exam**

Student Name: - ……..... **ID: - ……**

Question 1:- show that if *n* is an integer then $n^2 \equiv 0 \; or \; 1 \; (mod \; 4)$ **2 points**

Question 2:- solve the following congruence. **4 points**

$$89x \equiv 2 \; (mod \; 232)$$

Question 3:- use mathematical induction to prove that for all $n \geq 0, \quad 2|(n^2 + n)$ **3 points**

Question 4:- let A={1,2,3} be a set and $R1 = \{(a,b)|a < b\}$, $R2 = \{(a,b)|a \neq b\}$ are relations on set A, use zero-one matrix to find the followings. Then determine wither the results reflexive, symmetric, antisymmetric.

1- $R1 \cup R2$ **5 points**

2- $R1 \cap R2$

3- $R1 \circ R2$

Question 5:- use fermat's little theorem to find $45^{464} \; (mod \; 23)$ **2 points**

Question 6:- Build a recursive algorithm to find $n! \; (mod \; m)$ where *n* and *m* are positive integers. **4 points**

Good Luck

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