National University of Computer and Emerging Sciences, Lahore Campus				
	Course:	Discrete Structures	Course Code:	CS1005
	Program:	BS- Computer Science	Semester:	Fall 21
	Duration:	60 mins	Total Marks:	30
	Paper Date:	03-12-2021	Weightage	15
	Section:	All	Page(s):	
	Exam:	Sessional II	Roll No:	
Instruction/Notes:	Attempt All Questions			

Q.1. (4 marks) Give an example of a function from A to A where A= { 1,2,3,4} that is
a) one-to-one but not onto.
b) onto but not one-to-one.
c) both onto and one-to-one (but different from the identity function).
d) neither one-to-one nor onto.

Q.2. (4 marks) Let A be a set, and let B be a proper subset of A (so that B is not equal to A). Is it possible for B to have the same cardinality as A? Justify your answer with an example.

Q.3. (6 marks)
(a) Find a div m and a mod m when $a = -9999$, $m = 101$.

(b) what is (-5 mod 4) - (-3 mod 4) congruent to?
answer choices are given below

i) 2 mod 4
ii) 1 mod 4
iii) -2 mod 4
iv) -1 mod 4
v) None of above

(c) Let a and b be integers, and let m be a positive integer. If $a \equiv b \pmod{m}$ then what is relation between 'a mod m' and 'b mod m'?

Q.4. (6 marks) Prove that $2^n + 6 \cdot 9^n$ is always divisible by 7 for any positive integer n.

Q.5. (5 marks) Show that if you pick three socks from a drawer containing just blue socks and black socks, you must get either a pair of blue socks or a pair of black socks.

Q.6. (5 marks) Let R be the relation on the set of all URLs (or Web addresses) such that x Ry if and only if the Web page at x is the same as the Web page at y. Is R an equivalence relation?