***Quaid-i-Azam University, Islamabad***

***Terminal Exam Spring Semester 2020***

***Department. of Computer Sciences***

**Discrete Mathematics (MA-203) - B**

*Duration: 1 hour Date: 22-08-2020 (9:30-10:30)*

*Max Marks: 50 Instructor: Dr. Atta Ullah*

***Note:*** *All questions carry equal marks.*

**Q. 1:** Use mathematical induction to prove that

whenever *n* is a nonnegative integer.

**Q. 2:** In a state, all license plates consist of four to six symbols chosen from the 26 letters of the alphabet together with the ten digits 0–9.

**a.** How many license plates do not contain more than one repeated symbol?

**b.** What is the probability that a license plate chosen at random has a repeated symbol?

**Q. 3:** A partial order relation *R* has the following Hasse diagram. Find the directed graph of *R*.



**Q. 4:** Let *A* be the set of people living in the world today. A relation *R* is defined on *A* as follows: For all *p, q* ∈ *A, p R q* ⇔ *p* lives within 100 miles of *q*. Is this an equivalence relation if so find its equivalence classes.

**Q. 5:** Give two examples of graphs that have Hamiltonian circuits but not Euler circuits.