COMSATS University Islamabad

Attock Campus

Department of Mathematics

Quiz # 03

Class: BS(SE)-VIII
Subject: Stochastic Processes
Instructor: Dr. Atiq ur Rehman

Date: 11-11-2025
Course Code: CSC456
Marks: 09

Note: Solve the whole quiz only on one sheet.

Question # 1: State conditional law of total probability.
At a school, consider the following events:

- C: "Today is Monday."
- B_1: "It is sunny."
- B_2: "It is cloudy."
- A: "The teacher comes to school."

On Mondays, the weather can be sunny or cloudy with the following probabilities:

$$P(B_1 \mid C) = 0.6, P(B_2 \mid C) = 0.4.$$

The teacher's likelihood of coming to school depends on the weather:

$$P(A \mid B_1, C) = 0.8, P(A \mid B_2, C) = 0.3.$$

Using the law of total probability, compute the probability that the teacher comes to school given that it is Monday.

Question # 2: Let P represent the transition probability matrix for some Markov chain. Using Chapman Kolmogorov theorem and mathematical induction to show that

$$P^{(n)} = P^n \text{ for } n \geq 1 \text{ with } P^{(1)} = P.$$
