COMSATS University Islamabad

Attock Campus

Department of Mathematics

Assignment # 01

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

Due Date: 22-09-2025 (1330PST)
Course Code: CSC456
Marks: 20

Instructions:

1. Please provide your answers in the format we use in class, either handwritten or typed.
2. Submit the assignment in groups of five students.
3. If one member fails to answer the quiz from the assignment, the entire group will be considered unsuccessful.

Question # 0: You are kindly requested to write the following statement exactly as provided and to sign if handwritten or type your initials if composed.

"I have read the instructions and understand what I am writing."

Question # 1: Choose any two random numbers between 1 and 10. Write one to three lines explaining the method used to generate these numbers.

Question # 2: Write only two definitions from the list, corresponding to the numbers generated in Question # 1.

i. Discrete Random Variables
ii. The Bernoulli Random Variable
iii. The Binomial Random Variable
iv. The Geometric Random Variable
v. The Poisson Random Variable
vi. Continuous Random Variables
vii. The Uniform Random Variable
viii. Exponential Random Variables
ix. Gamma Random Variables
x. Normal Random Variables

Question # 3: Suppose that if it rains today, then it will rain tomorrow with probability α; and if it does not rain today, then it will rain tomorrow with probability β.

(a) Write the mathematical model of the above stochastic process.
(b) Draw the state transition diagram.
(c) Write the transition probabilities P_{ij}.
(d) Write the transition probability matrix P.
(e) If it rains on Tuesday, what is the probability that it will rain on Friday?
(f) If $\alpha = 0.7$ and $\beta = 0.4$, then calculate the probability that it will rain four days from today given that it is raining today.
