COMSATS University Islamabad

Attock Campus

Department of Mathematics

Assignment # 04

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

Due Date: 2-12-2025 (1500PST)
Course Code: CSC456
Marks: 10

Question # 1: (a) Define transition probability P_{ij}. (3+5+2)

(b) In a farming district in Pakistan, farmers each year decide which crop to sow: Wheat, Cotton, or Rice. Due to market prices, water availability and crop-rotation habits, farmers switch crops with the following yearly behaviour:

- Wheat farmers keep 75% of their land in wheat, switch 15% to Cotton, and 10% to Rice.
- Cotton farmers keep 65% of their land in cotton, switch 20% to Wheat, and 15% to Rice.
- Rice farmers keep 55% of their land in rice, switch 25% to Wheat, and 20% to Cotton.

Current sowing distribution in the district is: Wheat = 50%, Cotton = 30%, Rice = 20%.

Using these transition probabilities, what will be the sowing distribution (percentage of area under Wheat, Cotton, and Rice) after 3 years?

(c) Let state 0 represents wheat, 1 represents cotton and 2 represents rice. What is the value $P_{12}^{(4)}$?
