COMSATS University Islamabad

Attock Campus

Department of Mathematics

Assignment # 02

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

Due Date: 18-03-2026
Course Code: CSC456
Marks: 20

Assignment Submission Rules:

- **Format:** Submit the handwritten assignment as a PDF to the CR/GR.
- **Filename:** Use the format *a02-[registration-number]*.
  - ***Example:*** *a02-sp22-bse-096.pdf*
- **Warning:** Failure to follow the naming convention will result in your assignment being rejected.

Question # 1: A monitoring system (e.g., a camera, a human observer, or other device) tracks customers entering the local store. At regular intervals, the system records the customer's state as follows:

0: Browsing, 1: Purchasing, 2: Leaving

The data below presents the observed change in state for all 24 customers:

Customer #	Sequence of State	Customer #	Sequence of State
1	$0 \to 1 \to 2$	13	$1 \to 2 \to 1 \to 2$
2	$0 \to 0 \to 2$	14	$0 \to 0 \to 1 \to 2$
3	$0 \to 1 \to 2$	15	$0 \to 0 \to 2$
4	$0 \to 2$	16	$1 \to 0 \to 2$
5	$1 \to 0 \to 1 \to 2$	17	$0 \to 0 \to 0 \to 2$
6	$0 \to 1 \to 2$	18	$0 \to 0 \to 1 \to 2$
7	$0 \to 2 \to 0 \to 2$	19	$0 \to 1 \to 2$
8	$1 \to 0 \to 1 \to 2$	20	$0 \to 2 \to 1 \to 2$
9	$0 \to 0 \to 1 \to 2$	21	$0 \to 0 \to 2$
10	$0 \to 1 \to 2$	22	$0 \to 1 \to 2$
11	$1 \to 1 \to 0 \to 2$	23	$1 \to 1 \to 2$
12	$0 \to 1 \to 0 \to 2$	24	$1 \to 2 \to 0 \to 2$

(a) Find the transition probabilities P_{ij}.
(b) Write the mathematical model of the above stochastic process.
(c) Draw the state transition diagram as a weighted directed graph.
(d) Write the transition probability matrix P.
