Ahmedabad University

School of Arts and Sciences

# STA355 Stochastic Processes

**BS**

**Mid Term Examination 2022-23 (Monsoon Semester)**

**Total Marks = 50** **Time – 2 hours**

Enrolment Number:.....
Date: 17-09-2019
No. of printed pages: 1

***Section - A** : Attempt any four out of five. Each question carries 05 marks [***20 Marks]**

Q1. Discuss two examples of stochastic processes.

Q2. Let $X_1$ & $X_2$ be two independent exponential random variables with rate parameters

$\lambda$. Find the distribution of $X_1 + X_2$.

Q3. Given $S = \{0,1,2,3\}$, Calculate $P^2$ and hence $P[X_2 = j \mid X_0 = i]$ $i, j = 0,1,2,3$

$$P = \begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \end{pmatrix},$$

Q4. For the transition probability matrix in Q3, find the distribution of $X_2$.

Q5. Define a Markov Chain. What is its memory-less property?

***Section - B** : Each question carries 10 marks.* **[30 Marks]**

Q6. Discuss how simulation can be used in statistical inference.

Q7. State and prove the Baye`s theorem.

Q8. What is a counting process? Discuss the concepts of independent and stationary increments. 2 + 8