**B.Sc. DEGREE EXAMINATION, APRIL 2016.**

**III YEAR — VI SEMESTER**

**Major Paper XVI — STOCHASTIC PROCESSES**

**Time : 3 hours Max. marks : 60**

**SECTION A — (10 × 1 = 10 marks)**

**Answer any *TEN* questions.**

1. Define mean recurrence time.
2. Define a discrete time markov chain with stationary transition probabilities.
3. Define stationary process with an example.
4. Define Transient state.
5. Explain briefly the pure birth process.
6. When do you say a Markov chain is homogeneous?
7. Define the characteristics of the Queuing System.
8. Write down the postulates of Poisson process.
9. State the additive property of the Poisson process.
10. State the assumptions of a birth and death process.
11. What is immigration process?
12. Define the transition probability matrix.

**SECTION B — (5 × 4 = 20 marks)**

**Answer any *FIVE* questions.**

1. Explain the various classification of Stochastic process with examples.
2. Distinguish between Markov processes and Markov chain and give an example.
3. Prove that Poission process is evolutionary process.
4. Briefly explain covariance stationary.
5. Describe the pure death process.
6. State and prove the necessary and sufficient condition for a state i to be recurrent.
7. Describe the behavior of customers in queuing system.

**SECTION C — (3 × 10 = 30 marks)**

**Answer any *THREE* questions.**

1. State and prove Chapman-Kolmogorov equations.
2. A Markov chain with states 0, 1, 2 has TPM

 $p\left[\begin{matrix}^{3}/\_{4}&^{1}/\_{4}&0\\^{1}/\_{4}&^{1}/\_{2}&^{1}/\_{4}\\0&^{3}/\_{4}&^{1}/\_{4}\end{matrix}\right]$ h as initial distribution $P\left(X\_{0}=i\right)= ^{1}/\_{3}$

 For $i=0, 1, 2.$ Compute $P\left(X\_{2}=2, X\_{1}=1, X\_{0}=2\right)$

1. For a Poission process with n arrivals in (0, t), show that the inter arrival time of poission process is an exponential.
2. Derive the probability distribution of the Yule-Furry process. Hence fine its mean and variance.
3. For ****:FIFO queuing system, obtain the distribution of the waiting time in queue under steady state condition.

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