**B.Sc. DEGREE EXAMINATION, NOVEMBER 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 second order process.
2. Define state space.
3. State transition probability matrix of the Markov chain.
4. When a Markov chain is said to be homogeneous.
5. Write down the additive property of Poisson process.
6. State the relationship between Poisson Process and Binomial distribution.
7. Specify the differential equation of pure Birth process.
8. What is the mean of Yule- Furry Process?
9. Define service time.
10. What is traffic intensity?
11. State the order of a Markov Chain.
12. Write the Little’s formula.

**SECTION B — (5 × 4 = 20 marks)**

**Answer any *FIVE* questions.**

1. Give a brief note about Covariance Stationary and Process with independent increment.
2. Describe a Markov chain and its order.
3. Explain the Postulations of a Poisson process.
4. Explain about Immigration and Emigration Processes.
5. What are the operating characteristics of a queueing system?
6. Prove that the autocorrelation coefficient of Poisson Process is $\left(\frac{t}{t+s}\right)^{\frac{1}{2}}$.
7. Let $\left\{x\_{n },n\geq 0\right\}$ be a Markov chain with three states 0,1,2 and with transition matrix

 $\left[\begin{matrix}\frac{3}{4}&\frac{1}{4}&0\\\frac{1}{4}&\frac{1}{2}&\frac{1}{4}\\0&\frac{1}{4}&\frac{1}{4}\end{matrix}\right]$ and the initial distribution P[X0=i]=$\frac{1}{3}$, i=0,1,2. Find $P\left[\left(X\_{2}=2\right)\right].$

**SECTION C — (3 × 10 = 30 marks)**

**Answer any *THREE* questions.**

1. Describe the various classifications of Stochastic Process according to time and state space. Give examples.
2. State and Prove Chapman Kolmogorov equation.
3. Show that the interval between two successive occurrences of a Poisson process $\left\{N\left(t\right),t\geq 0\right\} having parameter$ $λ has a negative exponential$ distribution with mean$ \frac{1}{λ}$.
4. Describe Yule-Furry process. What is its mean and variance?
5. Derive the steady state equation of $(M/M$/1; ∞/FIFO).

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