



JBA-003-1173004 Seat No. _____

M. Sc. (Statistics) (Sem. III) (CBCS) Examination

December - 2019

MS - 304 : Stochastic Process

Faculty Code : 003

Subject Code : 1173004

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) Attempt all questions.
(2) Each question carries equal marks.

1 Answer the following questions : (Any **Seven**) **14**

- (1) The Probability mass function of Poisson process follows which distribution and what is the parameter of that distribution?
- (2) Mean of Pure Birth Process is _____.
- (3) A pure Birth process follows which distribution?
- (4) Define Markov Process.
- (5) Define Branching Process.
- (6) Define Non - Recurrent.
- (7) Probability mass function of Yule – fury birth process is _____.
- (8) Define Stationary Process.
- (9) Total probability of pure birth process is _____.
- (10) Define Random Walk Model.

2 Answer the following questions : (Any **Two**) **14**

- (1) Explain Decomposition theorem of a Poisson Process.
- (2) Explain Gambler's ruin problem.
- (3) Given that; $z = 2$, $a - z = 3$ and $a = 3$ if $p = 1/4$ and $q = 3/4$ that is $p > q$?

3 Answer the following questions : **14**

- (1) What is meant by probability transition matrix? Explain Markov's chain.
- (2) Discuss Chapman Kolmogorov equation.

OR

3 Answer the following questions : **14**

- (1) Prove that conditional probability of Poisson process gives binomial distribution.
- (2) Explain the one dimensional random walk.

4 Answer the following questions : (Any **Two**) **14**

- (1) Let $P_x = P(1-p)^x$, $x \geq 0$ such that...

$$S = \begin{cases} \frac{P}{1} - P; & \text{if } p \leq \frac{1}{2} \\ \frac{p}{q} & \text{if } S1 = \frac{p}{q} \end{cases}$$

$$\{ \quad 1; \text{ if } S2 = 1$$

- (2) Show that total probability of pure birth process is 1.
- (3) Classified the all chain and states. Explain any one chain and one state.

5 Answer the following questions : (Any **Two**) **14**

- (1) Explain Postulates of Poisson Process.
- (2) Find the probability of ultimate ruin of game when $p = q = 1/2$ and $p \neq q$.
- (3) Find mean and variance of branching process.
- (4) Prove that if $i \leftrightarrow j$ that is i and j are communicative. If i is recurrent (Persistent) then j is also recurrent (Persistent).