



**PC-003-1173004**

Seat No. \_\_\_\_\_

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

**May / June – 2018**

**MS-304 : Stochastic Process**

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

[Total Marks : 70

**Instructions :**

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

**1** Answer the following : (any seven) **14**

- (1) Total probability of pure birth process is \_\_\_\_\_.
- (2) What is the probability when state  $k$  is said to be transient or non-recurrent ?
- (3) Yule - Furry Process is also known as \_\_\_\_\_.
- (4) The difference of two Poisson processes gives which distribution ?
- (5) Explain Ergodic chain.
- (6) Define Periodic state.
- (7) Which is postulate of Poisson process ?
- (8) Conditional probability of Poisson Process gives which distribution ?
- (9) Mean of Pure Birth Process is \_\_\_\_\_.
- (10) A pure Birth process follows which distribution ?

**2** Answer the following : (any two) **14**

- (1) Prove that  $P_n(S) = P_{n-1}(P(S))$ .
- (2) What is meant by probability transition matrix ?  
Explain Markov's chain.
- (3) Find mean and variance of branching process.

- 3** Answer the following : **14**
- (1) Discuss Chapman Kolmogorov equation.
  - (2) Show that total probability of pure birth process is 1.

**OR**

- 3** Answer the following : **14**
- (1) Explain One - Dimensional Random Walk.
  - (2) Prove that conditional probability of Poisson Process gives Binomial Distribution.

- 4** Answer the following : (any two) **14**
- (1) Explain Gambler's ruin problem.
  - (2) Derive Probability Mass Function of Poisson Process.
  - (3) Prove that if  $i \leftrightarrow j$  that is  $i$  and  $j$  are communicative. If  $i$  is recurrent (Persistent) then  $j$  is also recurrent (Persistent).

- 5** Answer the following : (any two) **14**
- (1) Explain Postulates of Poisson Process.
  - (2) Define following terms :
    - (a) Stochastic process
    - (b) State - Space
    - (c) Non-Recurrent.
  - (3) Explain Decomposition theorem of a Poisson Process.
  - (4) Classify the all chain and states. Explain any one chain and one state.