

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – STATISTICS

FIFTH SEMESTER – APRIL 2013

ST 5400 - APPLIED STOCHASTIC PROCESSES

Date : 08/05/2013

Dept. No.

Max. : 100 Marks

Time : 1:00 - 4:00

Section-A

(10x2=20 marks)

Answer all the questions.

- 1) Define Stochastic Processes.
- 2) State any two applications of Markov Chain.
- 3) What is meant by discrete time space?
- 4) Define Null recurrence.
- 5) Give an example for Periodicity.
- 6) What is meant by random walk?.
- 7) Define the term TPM with an example.
- 8) Briefly explain communication of the states.
- 9) Define an absorbing state?
- 10) Define diffusion process

Section-B

(5x8=40 marks)

Answer any FIVE questions.

- 11) Explain in detail the applications of the Stochastic Processes.
- 12) Discuss the Gambler's Ruin problem with an example
- 13) Explain the following with an example i) Symmetry and ii) Transitivity of communication of states.
- 14) What is meant by stationary distribution? Explain any two applications..
- 15) Explain in detail the need for higher order transition probabilities with suitable illustration.
- 16) Discuss in detail pure birth process.
- 17) A white rat is put into the maze consisting of 9 compartments. The rat moves through the compartment at random. That is there are k ways to leave a compartment. The rat chooses each of the move with probability $1/k$.
 - a) Construct the Maze

b)The Transition probability matrix

18) State and prove Chapman-Kolmogorov equation.

Section-C

(2x20=40 marks)

Answer any TWO questions.

19) Discuss in detail the four classifications of the Stochastic Processes with illustrations.

(5+5+5+5 marks)

20. a) Show that a Markov Chain is fully determined, when its initial distribution and one step transition probabilities of the Markov chain are known.

b) Explain the social mobility problem. (12+8 marks)

21. a) Discuss in detail one dimensional random and two dimensional random walk problems with the TPM .

21. b) If the probability of a HOT day (state-0) following a COOL day (state-1) is $\frac{1}{3}$, and that of a cool day following a hot day is $\frac{1}{2}$. Find i) Probability that May 3 is a hot day given that May first is a hot day. ii) Probability that May 5 is a cool day given that May first is a hot day. (10+10 marks)

22. a) Write short notes on Point Process

b) Discuss the applications of basic limit theorem of Markov Chains. (10+10 marks)