# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**M.Sc.** DEGREE EXAMINATION - **STATISTICS** 

#### THIRD SEMESTER – NOVEMBER 2013

## ST 3816 - STOCHASTIC PROCESS

Date : 07/11/2013 Time : 9:00 - 12:00

Answer all the questions.

#### Section-A

(10x2=20 marks)

Max.: 100 Marks

- 1) Define Stochastic Processes with an example.
- 2) What is meant by discrete time space?
- 3) Briefly explain the term TPM with an example.
- 4) Define transient state.
- 5) Define an absorbing state.
- 6) Briefly explain Yule's process.
- 7) Define renewal process.
- 8) Briefly explain the term super Martingale.
- 9) Give any two examples of stationary process.
- 10) Define extinction probability..

#### Section-B

# Answer any FIVE questions.

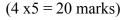
- 11) Discuss in detail any two types of classifications of the Stochastic Processes with illustrations...
- 12) Define the following i) Martingale ii) Sub and super martingales with an example.
- 13) Explain the brand switching model for consumer behavior and derive the TPM.
- 14) Show that a Markov Chain is fully determined, when its initial distribution and one step transition probabilities of the Markov chain are known.
- 15) Explain the application of renewal process in the risk theory and traffic flow.
- 16) Derive the differential equations for a pure birth process.
- 17) Explain the applications of branching process in i) Electron multiplier and ii) Survival of family name..
- 18) Briefly explain Poisson process and hence derive P<sub>n</sub>(t).

### Section-C

# Answer any TWO questions.

- 19) 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 probability1/k.
  - a) Construct the Maze
  - b) The Transition probability matrix
  - c) The equivalence class.
  - d) The periodicity of the state .

# (2 x 20=40 marks)



( 5x8=40 marks)

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20) Explain the following with neat diagram	
i) Excess life ii) Current life iii) Total life	
b) Derive the mean total life of the renewal process.	(15 + 5 = 20  marks)
<ul><li>21a) Explain the generating function relation of branching process and briefly explain the two type branching process.</li><li>b) State and prove the sums and variance of the independent random variables are martingale.</li></ul>	
<ul> <li>22) Write short notes on the following</li> <li>a) Stationary distribution.</li> <li>b) Renewal theorem and equation.</li> <li>c) Stopping time</li> </ul>	(10+10marks)
<ul><li>c) Stopping time</li><li>d) Age and block replacement</li></ul>	(5+5+5+5 marks)

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