LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **NOVEMBER 2013**

ST 3816 - STOCHASTIC PROCESS

Date : 07/11/2013 Dept. No. Max. : 100 Marks
Time : 9:00 - 12:00

Section-A

Answer all the questions. **(10x2=20 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. **(5x8=40 marks)**

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 $P_n(t)$.

Section-C

Answer any TWO questions. **(2 x 20=40 marks)**

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 . (4 x5 = 20 marks)

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)

21a) Explain the generating function relation of branching process and briefly explain the two type branching process.

b) State and prove the sums and variance of the independent random variables are martingale.

(10+10marks)

22) Write short notes on the following

a) Stationary distribution.

b) Renewal theorem and equation.

c) Stopping time

d) Age and block replacement (5+5+5+5 marks)

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