LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION –**STATISTICS**

FIFTH SEMESTER – **APRIL 2019**

16UST5MC01– APPLIED STOCHASTIC PROCESSES

Date: 15-04-2019 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART A

Answer ALL the questions: **(10X2=20)**

1. Define stochastic process.
2. Define state space and time of a stochastic process.
3. Define Markov Chain
4. Define transient and persistent states.
5. Define periodicity.
6. Define stationary distribution.
7. Define point process.
8. Mention the postulates of Poisson process.
9. Define branching process
10. What is meant by "ultimate extinction" of a branching process?

PART B

Answer any FIVE questions: **(5 X 8=40)**

11. Explain the classification of stochastic processes based on state and time with suitable examples.
12. Explain stochastic processes with independent increments.
13. Prove that the two-step T.P.M is the square of the one-step T.P.M for a Markov Chain.
14. Explain random walk between two barriers.
15. Explain the classifications of states in a Markov Chain.
16. Classify the states of a Markov Chain with the following one-step TPM:

	1	2	3	4
1	1/3	2/3	0	0
2	1	0	0	0
3	½	0	½	0
4	0	0	½	½

17. Show that the interval between two successive occurrences of a Poisson process follows negative exponential distribution.
18. Explain branching process with an example

PART C

Answer any TWO questions: **(2X20=40)**

19. Explain the specification and classifications of stochastic processes with suitableexamples.

20. a. If state j is persistent, then for every state k that can be reached from state j, prove that $F_{kj}=1$.

    b. State and prove ergodic theorem.

21. Explain in detail about pure birth process and Yule-Furry process.

22. For a branching process $\{X_n\}$, if $\varphi_n(s)$ is the generating function of X_n and $\varphi(s)$ is the generating function of X_1, show that $\varphi_n(s) = \varphi_{n-1}[\varphi(s)] = \varphi[\varphi_{n-1}(s)]$.

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