CLASS   : IMSC   SEMESTER   : VIII

BRANCH : MATH   SESSION: SP/2022

TIME: 2.00 HOURS   FULL MARKS : 50

Subject with Code : MA 413 Stochastic Process and Simulation

INSTRUCTIONS:

1. This question paper contains 10 questions each of 5 marks totalling 50 marks.
2. Answer all the questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph Paper etc. to be supplied to the candidates in the examination hall: NA

………………………………………………….

----

1 Why are generating functions useful in stochastic process? Define probability generating function and use it to find the mean and variance of Exponential distribution.   [5]

2. Define Laplace Transform for a random variable. How can it be used to find the mean and variance of a random variable? Explain with an example of your choice.   [5]

3. What do you mean by a stochastic process and its state space? What are the classes into which a stochastic process can be classified? Give examples to illustrate each class.   [5]

4.   Describe   a   Poisson   Process   explaining   its   postulates   clearly.   [5]

5. Show that if a Gaussian process is weakly stationary, it is strictly stationary also.
<div align="center">OR</div>
Distinguish clearly between a weakly stationary process and a strictly stationary process.   [5]

6.   Define a random walk and show that the position X_n of a particle after n steps in a random walk between two absorbing barriers constitutes a Markov chain.   [5]

7. Suppose that the probability of a dry day following a rainy day is 1/4 and the probability of a rainy day following a dry day is 1/3. Given that June 1 is a rainy day, find the probability that June 3 will be a dry day. [5]

8. Explain the difference between transient and persistent states of a Markov chain. When is a persistent state said to be null or non-null? What do you mean by the order of a Markov chain and why is it important? [5]

9. What is Monte Carlo Simulation? Explain inverse cdf technique with an example. [5]

10. Explain the procedure for simulating normal variates. Given two independent uniform U(0,1) variate values as 0.5238 and 0.2841, use them to simulate two independent normal variates each with mean 50 and variance 64.

OR

Write an algorithm to simulate a negative Binomial variate.

[5]

Date of Exam: 06.05.2022