

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DIP3G3:Modelling and Simulation	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Course Objectives:

To give exposure of stochastic processes and to show their importance in engineering education and research. To develop skills to identify a process, its inputs and outputs. Then to develop a model and quantify the results. To give hands on experience in MATLAB to be used as a simulation tool for the stochastic processes. To develop an orientation towards research in electronics and computer engineering.

Prerequisite(s):

Fundamental knowledge of probability theory.

COURSE CONTENTS

Unit I

Introduction to Probability Theory -Relative Frequency and Classical Definitions, Sample Space and Events, Conditional Probabilities, Independent Events, Bayes Formula, Bernoulli Trials.

Unit II

Random Variables- Definition, Discrete Random Variables, Probability mass Function, Distribution Functions: Bernoulli pmf, Binomial pmf, Geometric pmf, Poisson pmf, Continuous Random Variables, Cumulative Distribution Function(CDF), Probability Density Function (PDF), Exponential Distribution, Reliability and failure rate, Normal Distribution, Uniform Distribution. Mean, Variance and Moments of Random Variables, Function of a Random Variable and its Expectation, Jointly Distributed Random Variable.

Unit III

Markov Chains- Classification of stochastic process, Introduction to Markov chains, Classification of States, Transition Probabilities, Limiting State Probabilities, Higher Transition Probabilities, Concept of Transient States and Absorption Probabilities, Solution of Problems Based on Markov Chains.

Unit IV

Markov Processes -Introduction to Continuous Time Markov Chains, Birth and Death Processes, The Transition Probability Function, Limiting Probabilities, Exponential Distribution & Poisson Process. Solution of Problems Based on Continuous Time Markov Chains, Introduction to Queuing Theory and M/M/1 Queuing Systems.

Unit V

Simulation- Simulation of Queues, Statistical Inference and Few Examples on Simulation Estimation of Mean and Variance, Confidence Interval, Regression and Correlation analysis

Text and Reference Books:

- [1] S.M. Ross, "Introduction to Probability Models, 9th Edition, Elsevier Publication", 2007.
- [2] K.S.Trivedi, "Probability and Statistics with Reliability, Queuing and Computer Science Applications", 2nd Edition, A Wiley-Interscience Publication.
- [3] Averill M. Law, W. David Kelton, "Simulation Modeling and Analysis", 3rd Edition, Tata McGraw-Hill Publication.
- [4] A Papoulis, S.V Pillai, "Probability Random Variables and Stochastic Processes", 4th Edition, TMH Publication, 2002.