**PC 305 IT PROBABILITY AND RANDOM PROCESSES**

Instruction: 4 Periods per week

Duration of University Examination: 3 Hours

University Examination(SEE): 70 Marks

Sessionals(CIE): 30 Marks

**Course Objectives:**

1. To induce the ability to describe a random experiment in terms of procedure, observation, and a Probability model.
2. To inculcate ability to characterize functions of random variables
3. To familiarize the students with the methods to characterize stochastic processes with an emphasis on stationary random processes.

**UNIT – I**

Probability: Introduction, definitions. The Axioms of Probability: Set theory, Probability Space Conditional Probability, Baye’s Theorem. Repeated Trials: Combined Experiments, Bernoulli Trials Bernoulli’s theorem and games of chance.

The Concept of a Random Variable: Introduction, Continuous and Discrete Random variables.

**UNIT – II**

Distribution and Density functions: Properties. Specific Random Variables: Normal, Exponential, Uniform, Gamma, Bernouli, Binomial, Poisson, Geometric and Negative Binomial Distributions. Conditional Distributions, Normal Approximation, Poisson approximation,Functions of One Random Variable: The Random Variable g(x) , Distribution and density of g(x), Mean and Variance. Moments. Characteristic Functions and their properties.

**UNIT – III**

 Two Random Variables: Bivariate Distributions and their properties. One Function of Two Random variables and its density function. Two Functions of Two Random Variables and their Joint density. Joint Moments. Joint Characteristic Functions. Conditional Distribution and Density. Conditional Excepted Values.

**UNIT – IV**

Random Processes – Definitions. Classification, Stationarity- Wide Sense and Strict Sense stationary processes. Ergodicity – Mean and Correlation Ergodic process. Auto-correlation and Covariance functions with their properties.

**UNIT –V**

 Spectral representation of Random Peocesses: Power Spectral density and its properties, Weiner – Kintchine theorem. Gaussian Process, Poisson Process. Noise: Types, Low pass and Band pass representation of white noise.

**Suggested Reading:**

1. Papoulis: Probability, Random Variables and Stochastic Processes, 4th Edition Tata McGraw Hill, 2002
2. T.Veerarajan, “Probability, Statistics and Random Process”, 3rd Edition Tata McGraw Hill
3. Peyton Peebles: Probability, Random Variables and Random Signal Principles, Fourth Edition, Tata McGraw Hill,2009.
4. H.Stark and J Woods: Probability, Random Processes and Estimation Theory for Engineers, Prentice, 2010.
5. P.Ramesh Babu , “Probability Theory and Random Processes” – TMH Education Private Limited First Edition-2014