**13EC2202-RANDOM SIGNALS AND STOCHASTIC PROCESSES**

 Credits: 4

Lectures/Week: 4Hrs. Sessional Marks: 40

Univ.Exam.Duration: 3Hrs Univ.Exam.Marks: 60

 **UNIT-I**

**Probability**: Axioms- Joint and conditional probability - Bayes’ theorem - Bernoulli trials.

**Random Variable**: concept — Distribution function — Density functions —conditional density functions — Expectation — Conditional expected value — Moments — Chebyshev, Markov’s, and Chemoffs inequalities — Characteristics and moment generating functions - Transformation of continuous discrete random variable.

 **UNIT -II**

**Multiple Random Variables**: Vector random variables — Joint distribution / Density functions — Conditional density / Distribution functions - Statistical independence — pdf and cdf for sum of random variables — Central limits theorem - Operations on multiple random variables — Expected value of function of random variables — Joint characteristic function — Joint by Gaussian random variables — Transformations of multiple random variables.

 **UNIT – III**

Random Processes Concept — Stationarity — Independence — Time averages — Ergodicity — Correlation functions — Properties

Gaussian, Poisson, and Markov processes — Power spectral density and its properties — Relation between power spectral density and auto-correlation — Cross power spectral density and its properties — Power spectrum for discrete time processes and sequences — Definition of white and coloured noise.

 **UNIT-IV**

**Linear Systems with Random Inputs:** Random signal response of linear system — System evaluation using random noise— Spectral characteristics of system response - Band pass, Band limited, and Narrow band processes — Properties of band limited processes.

 **UNIT-V**

Modeling of Noise Sources: Classification of noise sources — Resistive (Thermal) noise — Effective noise temperature — Antenna as a noise source — Available power gain — Equivalent networks — Input noise temperature — Noise figure.

Optimum Linear Systems: Maximization of (S/N); matched filter for coloured and white noise — Minimization of mean squared error — Wiener filter.

**TEXT BOOKS:**

1. P.Z.Peebles Jr., “Probability Random Variables and Random Signal Principles”. Tata McGraw-Hill, 4 edition, 2001.

2. A.Papoulis and S.Unnikrishna Pillai, “Probability Random Variables and Stochastic Processes”, PHI, 4 edition, 2008

3. J.LAunon and V.Chandrasekhar, “Introduction to Probability and Random Processes”, McGraw-Hill 1997.

**REFERENCE:**

1. D.G. Childer, “Probability and Random Processes”, McGraw Hill, 1997.

5. GR.Babu and K. Pushpa, “Probability Theory and Stochastic Processes”, Premier Publishing House, 2003.