**17EC2204 – RANDOM SIGNALS AND STOCHASTIC PROCESSES**

**UNIT-I**

**PROBABILITY**: Introduction, Set theory and Venn diagrams -Axioms- Joint and conditional probability - Bayes’ theorem - Bernoulli trials.

**UNIT -II**

**RANDOM VARIABLE**: Concept — Distribution function — Density functions —Conditional density functions — Expectation — Conditional expected value — Moments — Chebyshev, Markov’s, and Chernoff’s inequalities — Characteristics and moment generating functions - Transformation of continuous and discrete random variables.

**UNIT -III**

**MULTIPLE RANDOM VARIABLES**: Vector random variables — Joint distribution / Density functions — Conditional density / Distribution functions - Statistical independence — pdf and CDF for sum of randomvariables — 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 – IV**

**RANDOM PROCESSES:** Concept — Stationarity — Independence — Time averages — Ergodicity — Correlation function and its 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-V**

**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-VI**

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