20PMECC100	**Applied Mathematics**	**(4-0-0) 4**

Contact Hours: 52

Course Learning Objectives (CLOs): This course will enable students to: Acquaint with principles of Probability theory, Random process, Linear Algebra, Wavelet transforms Laplace transform and Linear programming problems and apply the knowledge in the applications of Electronics and Communication Engineering Sciences.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		**Mapping to POs(1 to 4)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	Learn the idea of random variables (discrete/continuous) and probability distributions in analyzing the probability models arising in random processes.		1,2	
CO-2	Learn the concept of Wavelets and its Applications to Denoising**.**		1,2	
CO-3	Apply Linear Algebra, QR and singular value decomposition techniques for data compression, least square approximation in solving inconsistent linear systems.		1,2	
CO-4	Apply transform method to solve one-dimensional wave equation, one-dimensional heat equation, Laplace equation, Poisson equation.		1,2	
CO-5	Solve system of linear and non-linear equation arising in engineering fields.		1,2	

POs	PO1	PO2	PO3	PO4	PO5	PO6
Mapping Level	2.0	2.0				

Prerequisites: Basics of 1. Probability 2. Differentiation and Integration 3. Vectors.

Contents:

Probability Theory: Review of basic probability theory. Definitions of random variables and probability distributions, probability mass and density functions, expectation, moments, central moments, characteristic functions,

probability generating and moment generating functions-illustrations. Binomial, Poisson, Exponential, Gaussian and Rayleigh distributions example.

10 Hrs

2) Introduction to Linear Algebra: Groups, Fields, Binary Field Arithmetic, Construction of Galois Field and its basic properties. Vectors, matrices, Vector spaces.

Introduction to Wavelets: Introduction, The origin of wavelets, wavelets and other reality transforms. Wavelets in future. Continuous Wavelets: First level of introduction of wavelet transforms. Continuous time frequency representation of signals. Discrete Wavelet Transform signal decomposition (Analysis) frequency response, signal reconstruction. Applications of Wavelets in science and Engineering,

Denoising: Introduction, Denoising using wavelet shrinkage – statistical modelling and estimation, Noise estimation, Denoising Images with MATLAB. **12 Hrs**

3) Linear Algebra: Computation of Eigen values and Eigen vectors of real symmetric matrices-Given's method. Orthogonal vectors and orthogonal bases.Gram-Schmidt orthogonalization process.QR decomposition,singular value decomposition, least square approximations**.** **10 Hrs**

4)Transform Methods: Laplace transform methods for one dimensional wave equation–Displacement sina string–Longitudinal vibration of a elastic bar. Fourier transform methods for one dimensional heat conduction problems. Fourier transform methods for Laplace equation and Poisson equation.**10 Hrs**

5) Linear and Nonlinear Programming: Simplex Algorithm-Two Phase and Big -M techniques-Duality theory-Dual Simplex method, Nonlinear Programming–Constrained extremal problems-Lagranges multiplier method-Kuhn-Tucker conditions and solutions. **10 Hrs**

Reference Books:

1) Richard Bronson*, "*Schaum's Outlines of Theory and Problems of Matrix Operations*",* McGraw-Hill, 1988.

2) Venkataraman M K," Higher Engineering Mathematics", National Pub.Co,1992.

3) Sneddon,I.N., "Elements of partial differential equations", Dover Publications, 2006.

4) Taha H A, "Operations research- An Introduction", Mc Milan Publishing Co, 1982.

5) K.P. Soman, K.I. Ramachandran, Dr.G.Resmi; Insight into Wavelets (From theory to Practice), PHI Publications,3rd edition. 2010.