MATHEMATICAL TECHNIQUE FOR ENGINEERS

Course Code:	13M1WEC132	Semester:	1st Semester, M. Tech. (ECE)
Credits:	3	Contact Hours:	L-3, T-0,P-0

Pre-requisites: Higher Engineering Mathematics

Course Objectives:

The primary objective of this course is to provide the knowledge of mathematical tools which are useful for engineers.

Course Outcomes

Upon successful completion of this course the students will be able:

1. To develop a mathematical model for different physical problems.
2. To understand the vector spaces, and vectors, and their properties.
3. To understand the different decomposition methods.
4. To develop an algorithm using mathematical technique for the solution of the research problems of the areas like biomedical signal processing, radar signal processing, and communications etc.

Course Contents :

Unit	Topics	Text book	Lectures
1.	Introduction to Systems of Linear Equations Gaussian Elimination Matrices and Matrix Operations Inverses; Algebraic Properties of Matrices Elementary Matrices and a Method for Finding More on Linear Systems and Invertible Matrices Diagonal, Triangular, and Symmetric Matrices Applications of Linear Systems Network Analysis (Traffic Flow) Electrical Circuits Balancing Chemical Equations Polynomial Interpolation Leontief Input-Output Models	**[1] [5]**	**08**
2.	Euclidean Vector Spaces Vectors in 2-Space, 3-Space, and n-Space Norm, Dot Product, and Distance in Rn Orthogonality The Geometry of Linear Systems	**[1] [5]**	**06**

	Cross Product		
3.	Real Vector Spaces, Subspaces, Linear Independence, Coordinates and Basis, Dimension, Change of Basis, Row Space, Column Space, and Null Space, Rank, Nullity, and the Fundamental Matrix Spaces, Matrix Transformations from to Properties of Matrix Transformations,	**[1] [5]**	**08**
4.	Eigen values and Eigenvectors, Diagonalization, Complex Vector Spaces, Differential Equations, Inner Products, Angle and Orthogonality in Inner Product Spaces, Gram–Schmidt Process; QR-Decomposition, Best Approximation; Least Squares Least Squares Fitting to Data, Function Approximation; Fourier Series, Orthogonal Matrices, Orthogonal Diagonalization Quadratic Forms, Optimization Using Quadratic Forms, Hermitian, Unitary, and Normal Matrices	**[1] [5]**	**08**
5.	Laplace Transform, Z-transform, Fourier Transform, DTFT, DFT, DCT, DST, STFT, and CWT with applications	**[2][4]**	**06**
6.	Basic Probability Concepts, Random variables, Special Probability Distributions	**[3][6]**	**06**
	Total Lectures		**42**

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Evaluation Scheme

1. Test 1 : 15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
    1. 10 Marks : Class performance, Tutorials & Assignments
    2. 10 Marks : Quizzes
    3. 5 marks : Attendance

Text Books

1. Harword & Chriss Rorrers, "Elementary Linear Algebra".John Wiley & Sons,
2. Proakis, John G. Digital signal processing: principles algorithms and applications. Pearson Education India.
3. Oliber C. lbe "Fundamentals of Applied Probability and Random Processes" 2nd Edition, Academic Press is an imprint of Elsevier
4. S.Salivahanan, A, Vallavaraj, C Gnanapriya, "Digital Signal Processing", ,Tata McGraw-Hill Education, 2010

REFERENCE BOOKS

5. Kenneth Hoffman, "Linear Algebra" 2nd edition, PHI Publishers
6. Hayes, Monson H. Digital signal processing Tata McGraw-Hill edition 2004