MATHEMATICS - II
(Common to all Branches)

Course Code: 15BM1102

L	T	P	C
3	1	0	4

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1 Solve the linear system of equations analytically and compute Eigen values and eigenvectors of a square matrix.

CO 2 Numerically solve linear system of equations and compute eigen values and eigenvectors of a square matrix.

CO 3 Discuss and demonstrate difference equations to discrete systems.

CO 4 Calculate Fourier series and Fourier transforms for certain functions.

CO 5 Classify and solve partial differential equations and apply it to heat flow and wave propagation problem

UNIT-I **(10 Lectures)**

MATRICES:

Rank, Normal form, Echelon form, Consistency and Solution of system of simultaneous linear homogeneous and non-homogeneous equations. Finding Eigen values and eigen vectors, properties, Cayley-Hamilton theorem, computing inverse and powers of a matrix by applying Cayley-Hamilton theorem, Diagonalisation of matrix.

(2.7, 2.10, 2.13 -2.16)

UNIT-II **(10 Lectures)**

NUMERICAL METHODS IN LINEAR ALGEBRA:

Solution of linear simultaneous equations: LU decomposition, Jacobi iteration and Gauss-Seidel methods. Determination of Eigenvalues

and eigen vectors by iteration (Rayleigh's Power Method) . (28.5, 28.6(3), 28.7(1)(2), 28.9)

UNIT-III (10 Lectures)

DIFFERENCE EQUATIONS AND APPLICATIONS:

Introduction of Difference operators (forward, backward and shift operators), Introduction to difference equation, formation of difference equation, Linear difference equations and it's complete solution. Rules for finding the complementary function and complete integral, deflection of a loaded string. (29.1, 29.4, 31.1 - 31.6, 31.8)

UNIT-IV (10 Lectures)

FOURIER SERIES:

Euler's formulae, Dirichlet's Conditions for a Fourier expansion, functions having points of discontinuities, Change of interval, even and odd functions, half range series, wave forms.

Fourier transforms Fourier integral theorem, Fourier transform and inverse Fourier transform, Fourier sine and cosine integrals. – Fourier sine and cosine transforms – properties.(10.1 – 10.8, 22.1 – 22.5)

UNIT-V (10 Lectures)

PARTIAL DIFFERENTIAL EQUATIONS:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear first order (standard type) equations. Method of separation of variables

APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS:

Classification of second order linear Partial Differential Equations. Solutions of wave equation, one dimensional heat equation, and two-dimensional Laplace's equation under initial and boundary conditions.

(17.1 – 17.3, 17.5, 17.6, 18.1-18.7)

TEXT BOOK:

1. Dr.B.S.Grewal *"Higher Engineering Mathematics"*, 42nd Edition, Khanna Publishers, 2012.

REFERENCE BOOKS:

1. Kreyszig E, *"Advanced Engineering Mathematics"*, 8th Edition, John Wiley, Singapore, 2001.
2. Greenberg M D, *"Advanced Engineering Mathematics"*, 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
3. Peter V. O'Neil, *"Advanced Engineering Mathematics"*, 7th Edition, Cengage Learning, 2011.