UMA004 Mathematics - II

L	T	P	Cr
3	1	0	3.5

Course Objectives: To introduce students the theory and concepts of differential equations, linear algebra, Laplace transformations and Fourier series which will equip them with adequate knowledge of mathematics to formulate and solve problems analytically.

Linear Algebra: Row reduced echelon form, Solution of system of linear equations, Matrix inversion, Linear spaces, Subspaces, Basis and dimension, Linear transformation and its matrix representation, Eigen-values, Eigen-vectors and Diagonalisation, Inner product spaces and Gram-Schmidt orthogonalisation process.

Ordinary Differential Equations: Review of first order differential equations, Exact differential equations, Second and higher order differential equations, Solution techniques using one known solution, Cauchy - Euler equation, Method of undetermined coefficients, Variation of parameters method, Engineering applications of differential equations.

Laplace Transform: Definition and existence of Laplace transforms and its inverse, Properties of the Laplace transforms, Unit step function, Impulse function, Applications to solve initial and boundary value problems.

Fourier Series: Introduction, Fourier series on arbitrary intervals, Half range expansions, Applications of Fourier series to solve wave equation and heat equation.

Course Learning Outcomes: Upon completion of this course, the students will be able to:

1. solve the differential equations of first and 2nd order and basic application problems described by these equations.
2. find the Laplace transformations and inverse Laplace transformations for various functions. Using the concept of Laplace transform students will be able to solve the initial value and boundary value problems.
3. find the Fourier series expansions of periodic functions and subsequently will be able to solve heat and wave equations.
4. solve systems of linear equations by using elementary row operations.
5. identify the vector spaces/subspaces and to compute their bases/orthonormal bases. Further, students will be able to express linear transformation in terms of matrix and find the eigen values and eigen vectors.

Text Books:

1) Simmons, G.F., Differential Equations (With Applications and Historical Notes), Tata McGraw Hill (2009).
2) Krishnamurthy, V.K., Mainra, V.P. and Arora, J.L., An introduction to Linear Algebra, Affiliated East West Press (1976).

Reference Books:

1) Kreyszig Erwin, Advanced Engineering Mathematics, John Wiley (2006), 8th ed.
2) Jain, R.K. and Iyenger, S.R.K , Advanced Engineering Mathematics, Narosa Publishing House(2011), 11th ed.

Evaluation Scheme:

Sr.No.	Evaluation Elements	Weight age (%)
1.	MST	30
2.	EST	45
3.	Sessionals (May include assignments/quizzes)	25