Course Syllabi: UMA002 Mathematics-II (L : T : P :: 3 : 1 : 0)

1. **Course number and name:** UMA002; Mathematics-II

2. **Credits and contact hours:** Credits: 3.5; Hours: 4

3. **Text book, title, author, and year**

   - *Krishnamurthy, V.K., Mainra, V.P. and Arora, J.L., An introduction to Linear Algebra, Affiliated East West Press (1976).*
   - *Simmons, G.F., Differential Equations (With Applications and Historical Notes), Tata McGraw Hill (2009) 2nd ed.*
   - *Kasana, H.S., Complex Variables: Theory and Applications, Prentice Hall of India (2004) 2nd ed.*
   - *Kreyszig Erwin, Advanced Engineering Mathematics, John Wiley (2006) 8th ed.*
   - *Ram Babu, Engineering Mathematics, Pearson Education (2009).*
     Tom M, Calculus, Vol I and II John Wiley (2003).

   a. Other supplemental materials
      - Nil

4. **Specific course information**

   a. Brief description of the content of the course (catalog description)

   Linear Algebra: Row Reduced Echelon Form, Solution of System of Linear Equations, Matrix Inversion, Linear Spaces, Subspaces, Dimension and Basis, Linear Transformation and Its Matrix Representation. Eigen-Values, Eigen-Vectors, Diagonalisation, Special Type of Matrices and Their Properties.
   Complex Variables: Basics of Complex Plane, Analytic Functions, Cauchy-Riemann Equations, Harmonic Functions, Elementary Functions: Exponential, Trigonometric, Hyperbolic, and Their Inverses, Complex Exponents.
   Ordinary Differential Equations: Classification and Construction of Differential Equations, Exact Differential Equations, Bernoulli, Riccati Equation, Claiurat Form, Second and Higher Order Differential Equations, Solution Techniques: using one known solution, Cauchy - Euler Equation Method of Undetermined Coefficients, Variation of Parameters Method, Operator 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.
   Partial Differential Equations: Introduction, First Order Equations, Lagrange Linear Equations, Charpits Method (Including Standard Forms).

5. **Specific goals for the course**

   After the completion of the course, the students will be able to:
   - Solve differential equations of first and second order using various analytical methods.
   - Solve ordinary and partial differential equations using the Laplace transform and Fourier series.

- Apply the concept and consequences of analyticity and the Cauchy-Riemann equations on harmonic and entire functions.
- Solve systems of linear equations and analyze vectors in R^n geometrically and algebraically.
- Analyze vector spaces and subspaces over a field, and to find linear transformations and their properties, matrices of linear transformations.

6. **Brief list of topics to be covered**
    - Linear Algebra
    - Complex Variable
    - Ordinary Differential Equations
    - Laplace Transform
    - Fourier Series
    - Partial Differential Equations