RKUNIVERSITY

SYLLABUS

Course Title	ENGINEERING MATHEMATICS-IV
Course Code	MA401
Course Credit	Lectures : 03
	Practical : 00
	Tutorial : 01
	Total : 04

Course Learning Outcomes:

After Successful completion of the above course, students will be able to:

- **Interpret** the interplay between the geometry of the plane and the arithmetic of Complex numbers.
- **Integrate** notions of derivatives, logarithms, line integrals, and power series from the calculus sequence with their complex counter parts, and **Interpret** how the complex Versions generalize.
- **Evaluate** numerical solution of equations.
- How various numerical problems can be **Classify** and understand analytically and Geometrically to aid in obtaining a solution method.

Detailed Syllabus

Sr. No.	Name of chapter & Details	Hours Allotted
	SECTION-I	
1.	**Fundamental of Complex Variable:** Limit, Continuity, Differentiability, Analytic functions, Cauchy-Riemann Equations, Necessary and sufficient condition for analyticity, harmonic functions.	**04**
2.	**Complex Integration** Curves, Line Integrals and its properties. Line integral of single valued functions, Line integral of multiple valued functions. Cauchy-Gaursat Theorem, Cauchy Integral Formulae, Cauchy's inequality –Liouville's and Morera's theorem.	**06**
3.	**Power Series and Applications of Contour Integration** Convergence of power series, Taylor and Laurent Theorems, Laurent series expansions, Zeros of analytic function, Singularities of analytic functions and their classification, Residues: Residues Theorem, Evaluating various type of definite real integrals using contour integration method.	**07**
4.	**Conformal Mapping And Its Applications:** Mapping by elementary functions, Mobius transformation : Special transformations	**04**

	Total	**21**
	SECTION-II	
5.	**Roots of Algebraic and Transcendental Equation:** Solution of a nonlinear equation by the methods of Bisection, False position, Secant method, Newton-Raphson method and their rate of convergence.	**05**
6.	**Interpolation and Extrapolation** Newton's Forward, Newton's Backward, Central differences interpolation formulae, Stirlig's, Bessels's, Laplace-Evertt's, Lagrange's, Newton's divided differences interpolation formula and error of the interpolating polynomial.	**06**
7.	**Numerical Integration** Trapezoidal Rule and error estimation in Trapezoidal Rule, Simpson's 1/3 Rule and error estimation in Simpson's 1/3 Rule, Simpson's 3/8 Rule and error estimation in Simpson's 3/8 Rule, Gaussian integration	**04**
8.	**Solution of a System of Linear Equation** Implementation of Gaussian elimination by partial pivoting, Gauss-Seidel method.	**03**
9.	**Ordinary Differential Equations** Numerical solution of ordinary differential equations, Euler's method, Improved Euler's (Heun's) method, Runge-kutta methods.	**03**
	Total	**21**

Instructional Method and Pedagogy:

- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Seminar/will be conducted.
- The course includes tutorials, where students have an opportunity to practice the examples for the concepts being taught in lectures.

Reference Books:

1. Brown James, Ward Churchill Ruel, Complex Variables and Application, V-McGraw Hill International New York (7th Edition).
2. Erwin Kreysing ,Higher Engineering Mathematics, Wiley India Publications – 8th edition.
3. Dr. R.C. Shah,Introduction to Complex Variables and Numerical Methods, Books India Publications (1st edition)
4. Grewal B. S., Numerical Methods in Engineering and Science with Programs in Fortran 77, C and C++, Khanna Book Publishing Co. (P) Ltd. Delhi (7th edition)
5. Vedamurthy V. N.& Iyengar S. R. K.,Numerical Methods, Vikas publishing house pvt. Ltd., New Delhi (1st edition)
6. Grewal B. S. and Grewal J. S.,Higher Engineering Mathematics, Khanna Book Publishing Co. (P) Ltd. Delhi (39th edition)
7. Chapra Steven, C. Canale Raymond, Numerical Methods for Engineers, P. - Tata Mc Graw-Hill Publishing Company Limited New Delhi (5th edition)
8. Datta N.,Computer Oriented Numerical Methods , Vikas publishing house pvt ltd New Delhi (1st edition)