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| 1. | Title of the course | Numerical Analysis |
| 2. | Course number | MA203L |
| 3. | Structure of credits | 3-0-0-3 |
| 4. | Offered to | UG |
| 5. | New course/modification to | Modification To MA2024/7 |
| 6. | To be offered by | Department of Mathematics and Statistics |
| 7. | To take effect from | July 2022 |
| 8. | Prerequisite | Nil |
| 9. | **Course Objective(s):** This course is to introduce the basic concepts of numerical analysis to the students. To learn how to find roots of a polynomial or a non-linear equation, and interpolate a polynomial. To demonstrate methods to solve differential equations and system of linear equations numerically. To identify different methods to find the approximate integration. | |
| 10. | **Course Content:** Introduction: Round-off Error, Truncation Error, Errors in Scientific and Engineering Computation. Interpolation: Lagrange's interpolation, forward, backward and divided differences, error of the interpolating polynomial. Numerical Solutions of Nonlinear Equations: Bisection method, regula-falsi, secant method, Newton's method, fixed-point iteration, convergence acceleration for fixedpoint iteration, real roots of polynomials, complex roots of polynomials. Numerical Integration: Basic methods of numerical integration, Gaussian rules, composite rules, adaptive quadrature. Solution of a System of Linear Equations: Gaussian elimination, pivoting strategy, LU- factorization, Cholesky's method, ill-conditioning, norms, Jacobi and Gauss-seidel methods, partial pivoting. Numerical Solution of Differential Equations: Taylor series method, Euler method, Runge-Kutta method, predictorcorrector methods for initial value problems, Adams-Moulton method, shooting method and finite difference methods for boundary value problems. | |
| 11. | **Textbook(s):**<br>1. Kreyzig E, *Advanced Engineering Mathematics*, John Wiley & Sons (2010). | |
| 12. | **Reference(s):**<br>1. Hildebrand F B , *Introduction to Numerical Analysis*, Tata McGraw-Hill (1993).<br>2. Conte S D and deBoor C, *Elementary Numerical Analysis An Algorithmic Approach*, McGraw-Hill (1980). | |