

MT-504	Numerical Methods and Applications
	<p><u>Numerical solution of Ordinary Differential Equations:</u> Multistep methods, Consistency & stability, Convergence of multi step methods. A low-order predictor-corrector algorithm , Convergence and stability theory for multistep methods, Stiff differential equations and the method of lines, Boundary value problems.</p> <p><u>Difference Methods of Partial Differential Equations:</u> BVPs for 2nd order elliptic PDEs, Five-point discretisation of the laplacian, Finite element methods, Difference methods for the heat equation, Difference methods for hyperbolic equations, Hyperbolic conservation laws.</p> <p><u>Iterative methods for linear systems:</u> Matrix splitting techniques, Successive over relaxation methods.</p> <p><u>The conjugate gradient method:</u> Introduction, Gradient, Taylor series, Necessary and sufficient conditions for local minima, Convex and concave functions, Optimization of convex functions, Algorithms, Closed algorithms, Decent function, Global convergence, Rate of convergence, Dichotomous search, Fibonacci search, Golden-Section search, Quadratic interpolation, Cubic interpolation, Broyden family, Inexact line search.</p> <p><u>Reference Books:</u></p> <ul style="list-style-type: none"> • Chapra S.C, <i>Applied Numerical Methods with Matlab for Engineering and Science</i>, Hill-MGraw, 2004. • Chapra S.C, <i>Numerical Methods for Engineers</i>, 6th Edition, McGraw-Hill, 2010.