Interpolation, Differentiation and Integration Interpolation: Lagrange's interpolation - Errors in Lagrange's interpolation - Newton's divided differences - Newton's finite dif ference interpolation - Optimal points for interpolation - Piecewise Interpolation: Piece wise linear and piecewise Cubic Spline interpolation Numerical differentiation: Numerical differentiation based on interpolation, finite differences, method of undetermined coeffi cients; Numerical integration: Newton Cotes formulae - Gaussian quadrature - Errors in Simpson's rule and Gaussian quadrature - method of undetermined coefficients - quadra ture rules for Multiple integrals.

Ordinary Differential Equations Single - Step methods: Euler's method and Modified Euler's method - Taylor series method - Runge -Kutta method of fourth order - Multi step methods: Adams-Bashforth - Adams - Moulton methods - Stability considerations - Two point BVPs: Finite Difference method - Linear problems with Dirichlet and derivative boundary conditions - Stiff equations - Eigenvalue problems.

References

1. Atkinson. K.E., "An Introduction to Numerical Analysis", Wiley, 1989 .
2. Phillips, G.M and Taylor, P.J., "Theory and Applications of Numerical Analysis", Second Edition, Elsevier, New Delhi, 2006.
3. Isaacson.E., and Keller, H.B., "Analysis of Numerical Methods" Dover, 1994.
4. Conte. S.D., and Carl de Boor, "Elementary Numerical Analysis", Third Edition, McGraw-Hill Book Company, 1983.
5. Kincaid D. and Chenney W., "Numerical Analysis: Mathematics of Scientific Com puting", Brooks/Cole Pub. 2nd Edition, 2002.
6. A. Quarteroni, F.Saleri and P. Gervasio, Scientific Computing with MATLAB and Octave,Springer Science & Business Media, 2010.

Code:MSM534 Computational Lab

Introduction to basic operators, Functions and Predefined Variables, Defining Vari

Lectures : 0 Tutorials : 0 Practical : 4 Credits : 2
ables/Matrices, Matrix Operations, Plotting Graphs -
Two-Dimensional Plots - Three Dimensional Plots,
General Commands, Polynomials, Curve Fitting and
Interpolation - programming exercise (Numerical
Methods) including development of algorithms to solve
ordinary differential equations and partial differential
equations.