

**Syllabus for the First Degree Programme in Mathematics
of the University of Kerala**

**Semester V
Numerical Methods**

CODE: MM 1544

Instructional hours per week: 3
No. of credits: 3

Module 1 We begin with an explanation of algebraic and transcendental functions. Fundamental theorem of algebra, application of location of roots theorem, Bisection method of obtaining one root, intersection method, Regula-Falsi method, Newton-Raphson method of obtaining roots, different types of errors, applications of errors, convergence of the methods.

Use computers to draw the graphs of linear, quadratic and cubic equations in one variable and locate their roots.

Module 2 Review of the different methods (Cramer's rule, matrix - inverse method, using matrix transformations) to find the solution of linear equations. Gaussian elimination method, Gauss - Jordan method, Gauss-Siedel method and Jacobi methods.

Solving first order non-linear differential equations by Picard's method, solving first order differential equations by Taylor series method, Euler method (commercial solution), modified Euler method (commercial solution), Runge-Kutta method (commercial solution).

Module 3 Finite difference operators like $\Delta, E, \delta, \nabla$ and their relations, interpolation with equal intervals, Newton's forward interpolation, Newton's backward interpolation, Stirling's formula, interpolation with unequal intervals, Lagrange's formula, inverse interpolation.

Finding first and second derivatives using Newton's forward and backward formula and Stirling's formula, finding the maxima and minima of a given data, general quadrature formula for numerical integration, Trapezoidal rule, Simpson's $\frac{1}{3}$ rule and Simpson's $\frac{3}{8}$ rule.

Assignments / Projects : Students must be encouraged to write computer programs and solve different problems.

TEXT: S S Sastry: Introductory Methods of Numerical Studying, PHI

References:

1. G F Simmons: *Differential Equations with Historical Notes*
2. Erwin Kreyszig: *Advanced Engineering Mathematics*
3. K Sankara Rao: *Numerical Methods for Scientists and Engineers*, PHI

DISTRIBUTION OF INSTRUCTIONAL HOURS:

Module 1: 18 hours; Module 2: 18 hours; Module 3: 18 hours