Course Name: MATHEMATICAL METHODS

Course Code: MAT 509

SYLLABUS:

Fourier Series, Laplace transform and Fourier transform: Fourier series, Generalized Fourier series, Fourier Cosine series, Fourier Sine series, Fourier integral. Fourier transform and inverse Fourier Transform, Laplace transform, convolution theorem and inverse Laplace transform and application in solving differential equation.

Integral Equations and Numerical Method: Integral Equations: Regular Integral equations: Volterra integral equations, Fredholm integral equations, Volterra and Fredholm equations of first and second kind, Volterra and Fredholm equations with regular kernels. Degenerate kernel, Fredholm Theorem, Method of Successive approximation.

Green's function: Concept and calculation of Green's function, Approximate Green's function, modified Green's function, Green's function method for differential equations, Green's function in integral equations.

Calculus of Variation: Calculus of Variation: Introduction, problem of brachistochrone, isoperimetric problem, concept of extrema of a functional, variation and its properties. Variational problems with fixed boundaries, The Euler equation, The fundamental lemma of calculus of variations. Variational problems with moving boundaries, Sufficient conditions for an extremum, Field of extremals, Jacobi conditions, Legendre Condition, Rayleigh- Ritz method, Galerkin's methos.

REFRENCES:

1. F. G. Tricomi: Integral equations, Inter science, New York.
2. P. Hartman: Ordinary Differential Equations, John Wiley, 1964.
3. I.M. Gelfand and S. V. Francis: Calculus of Variation, Prentice Hall, New Jersey.
4. L. G. Chambers: Integral Equations, International Text Book Company Ltd., London.
5. R.P. Kanwal: Linear Integral Equations, Birkhauser, Inc., Boston, MA, 1997.
6. Shair Ahmad and M.R.M. Rao: Theory of ordinary differential equations, Affiliated East-West Press Pvt. Ltd., New Delhi, 1999.