MT503: Differential Equations, Calculus of Variations

Syllabus: Non-linear ordinary differential equations of particular forms; Riccati's equation-General solution and the solution when one. two or three particular solutions are known; Total Differential equations; Partial differential equations of second order with variable coefficients-Monge's method; Classification of linear partial differential equation of second order; Cauchy's problem, Method of separation of variables; Laplace Wave and Diffusion equations; Canonical forms; Linear homogeneous boundary value problems; Eigen values and eigen functions. Sturm-l.iouville boundary value problems; orthogonality of eigen functions. Reality of eigen vaiues; Calculus of variation - Functional; Variation of a functional and its propertie; Variational problems with fixed boundaries; Euler's equation, Extremals; Functional dependent on several unknown functions and their first order derivatives; Functionals dependent on higher order derivatives; Functionals dependent on the function of more than one independent variable; Variational problems in parametric form;

UNIT SCHEDULE

Unit 1   Non-linear ordinary differential equations of particular forms and Riccati's equation
Unit 2   Total Differential equations
Unit 3   Partial differential equations of second order with variable coefficients-Monge's method
Unit 4   Classification of Linear PDE of second order; Cauchy's problem and Method of separation of variables
Unit 5   Laplace, Wave and Diffusion equations and Canonical forms
Unit 6   Eigen values , Eigen functions and Sturm-l.iouville boundary value problems
Unit 7   Variational problems with fixed boundaries and Euler's Lagrange equation
Unit 8   Functional dependent on Higher order Derivative and Variation problems in Parametric form