

FOURTH SEMESTER

MT606: ANALYSIS AND ADVANCED CALCULUS-II

Syllabus: Adjoint of an operator on a Hilbert space. Self-adjoint; Positive; Normal and Unitary operators and their properties; projection on a Hilbert space; invariance; Reducibility. Orthogonal projections; Eigen-values and eigen-vectors of an operator; Spectrum of an operator, Spectral theorem; Derivatives of a continuous map from an open subset of Banach space to a Banach space; Rules of derivation; Derivative of a composite. Directional derivative; Mean value theorem and its applications; Partial derivatives and Jacobian Matrix. Continuously differentiable maps; Higher derivatives; Taylor's formula; Inverse function theorem; Implicit function theorem. Step function. Regulated function, primitives and integrals, Differentiation under the integral sign, Riemann integral of function of real variable with values in normal linear space; Existence and uniqueness of solutions of ordinary differential equation of the type $x' = f(t, x)$.

UNIT SCHEDULE

- Unit 8** Projections on Hilbert space and Spectral Theory
- Unit 9** The Derivative
- Unit 10** Higher Derivative
- Unit 11** The integral in a Banach Space
- Unit 12** Differential Equations
- Unit 13** Connected and locally connected spaces
- Unit 14** Product and Quotient spaces
- Unit 15** Nets, Filters