**MA7701 Integral Equations and Calculus of Variation**

**Integral Equations:** Basic concepts, Volterra integralequations, relationship between linear differential equations and Volterra equations, resolvent kernel, method of successive approximations, convolution type equations, Volterra equation of the first kind. Abel s integral equation. Fredholm integral equations, Fredholm equations of the second kind, the method of Fredholm determinants, iterated kernels, integral equations with degenerate kernels, eigen values and eigen functions of a Fredholm alternative, construction of Green s function for BVP, singular integral equations.

**Calculus of Variations:** Euler - Lagrange equations, degenerate Euler equations, Natural boundary conditions, transversality conditions, simple applications of variational principle, sufficient conditions for extremum. Variational formulation of BVP, minimum of quadratic functional. Approximate methods -Galerkin s method, weighted-residual methods, Colloation methods. Variational methods for time dependent problems.

**References:**

1. Hochstadt, Integral Equations, CBS Publishers (30 January 2014), ISBN-13: 978 8126546978

2. S. Schwabik (Author), M. Tvrdy (Author), Otto Vejvoda, Differential and Integral Equations: Boundary Value Problems and Adjoints, Kluwer Academic Publishers; 1979 ed. edition (14 May 1979), ISBN-13: 978- 9027708021

3. A First Course in Integral Equations, Wazwaz, Abdul - Majid, World Scientific Publishing Company; Second edition (16 June 2015), ISBN-13: 978-9814675123

4. Isarel M. Gelfand, S. V. Fomin, Calculus of Variations (Dover Books on Mathematics), Dover Publications Inc. ISBN-13: 978-0486414485

5. Gupta A.S, Calculus of Variations with Applications Paperback – 1996, Prentice Hall India Learning Private Limited (1996), ISBN-13: 978-8120311206