Fractional Calculus: Study of basic functions – Gamma function, Mittag-Leffler function, Hypergeometric function, fractional calculus a generalization of integer order calculus.

Fractional derivatives and Integrals: Definition of fractional derivatives and integrals- Riemann-Liouville, Caputo and Grunwald-Letnikov, and their relations, properties of fractional derivatives, computation of fractional derivatives for some basic functions like constant, exponential, log, sine, cosine, Laplace transform of Riemann-Liouville, Caputo and Grunwald-Letnikov derivatives.

Properties of Differintegration: Linearity, differintegration term by term, homogeneity, scale change Leibniz’s rule, chain rule.

Differintegration of simple functions: Differintegrable functions-unit function, zero function, function of (x-a), function (x-a)^p, Binomial function, exponential functions, Heaviside and Dirac functions.


Applications of Fractional Calculus: Able’s fractional integral equation- the Tautochrone problem, fractional damped motion, semi-infinite line in circuits -semi-differentiator circuit.

TEXT BOOKS/ REFERENCES: