MA 411: TECHNIQUES OF APPLIED MATHEMATICS (3-1-0:4)

Integral equations: basic concepts, Volterra integral equations, 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, eigenvalues and eigenfunctions of a Fredholm alternative, construction of Green's function for BVP, singular integral equations.

Laplace transforms: definitions, properties, Laplace transforms of some elementary functions, convolution theorem, inverse Laplace transformation, applications.

Fourier transforms: definitions, properties, Fourier transforms of some elementary functions, convolution theorem, Fourier transform as a limit of Fourier series, applications to PDE.

Text Books and References:

1. P. Dyke, "An Introduction to Laplace Transforms and Fourier Series", Springer Undergraduate Mathematics Series.
2. F. G. Tricomi, "Integral Equations", Dover Publications Inc.
3. D. Porter and D. S. G. Stirling, "Integral Equations: A Practical Treatment, from Spectral Theory to applications", Cambridge University Press.