MA 201 Mathematics- III (3-1-0-8)

Complex numbers and elementary properties. Complex functions - limits, continuity and differentiation. Cauchy-Riemann equations. Analytic and harmonic functions. Elementary functions. Anti-derivatives and path (contour) integrals. Cauchy-Goursat Theorem. Cauchy's integral formula, Morera's Theorem. Liouville's Theorem, Fundamental Theorem of Algebra and Maximum Modulus Principle. Taylor series. Power series. Singularities and Laurent series. Cauchy's Residue Theorem and applications. Mobius transformations. First order partial differential equations; solutions of linear and nonlinear first order PDEs; classification of second-order PDEs; method of characteristics; boundary and initial value problems (Dirichlet and Neumann type) involving wave equation, heat conduction equationi, Laplace's equations and solutions by method of separation of variables (Cartesian coordinates); initial boundary value problems in non-rectangular coordinates. Laplace and inverse Laplace transforms; properties, convolutions; solution of ODE and PDE by Laplace transform; Fourier series, Fourier integrals; Fourier transforms, sine and cosine transforms; solution of PDE by Fourier transform.

Textbooks:

[1] J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

[2] I. N. Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1957.

[3] S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

References:

[1] T. Needham, Visual Complex Analysis, Oxford University Press, 1999.

[2] J. H. Mathews and R. W. Howell, Complex Analysis for Mathematics and Engineering, 3rd Ed., Narosa,1998.