MA201 Mathematics III (3-1-0-8)

Prerequisite: Nil

Complex analysis: Complex numbers and elementary properties; Complex functions limits, continuity and differentiation, Cauchy-Riemann equations, analytic and harmonic functions, elementary analytic functions, anti-derivatives and line (contour) integrals, Cauchy-Goursat theorem, Cauchy's integral formula, Morera's theorem, Liouville's theorem, Fundamental theorem of algebra and maximum modulus principle; Power series, Taylor series, zeros of analytic functions, singularities and Laurent series, Rouche's theorem and argument principle, residues, Cauchy's Residue theorem and applications, Mobius transformations and applications.

Partial differential equations: Fourier series, half-range Fourier series, Fourier transforms, finite sine and cosine transforms; First order partial differential equations, solutions of linear and quasilinear first order PDEs, method of characteristics; Classification of second-order PDEs, canonical form; Initial and boundary value problems involving wave equation and heat conduction equation, boundary value problems involving Laplace equation and solutions by method of separation of variables; Initial boundary value problems in non-rectangular coordinates.

Laplace and inverse Laplace transforms, properties, convolutions; Solution of ODEs and PDEs by Laplace transform; Solution of PDEs by Fourier transform.

Texts:

[1] J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, McGraw Hill, 2004.
[2] I. N. Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1957.
[3] E. Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley, 2015.

References:

[1] J. H. Mathews and R. W. Howell, Complex Analysis for Mathematics and Engineering, 3rd Edition, Narosa,1998.
[2] S. J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover Publications, 1993.
[3] K. Sankara Rao, Introduction to Partial Differential Equations, 3rd Edition, Prentice Hall of India, 2011.