(MT- 602) Non-Linear Differential Equations

An exact method for ODEs, An nth order equation, autonomous equations -independent variable missing, Bernoulli equation, Clairaut's equation, computer-aided solution, constant coefficients linear equations, contact transformation, delay equations, dependent variable missing, differentiation method, eigenfunction expansions, equidimensional-in-x equations, equidimensional-in-y equations, Euler equations, exact first order equations, exact second order equations, exact nth order equations, factoring equations, factoring operators, factorization method, Fokker-Planck equation, fractional deferential equations. free boundary problems, generating functions, green's functions, homogeneous equations, method of images, integrable combinations, integral representation: Laplace's method integral transforms, finite intervals integral transforms: infinite intervals integrating factors interchanging dependent and independent variables, Lagrange's equation, Lie Groups: ODEs operational calculus pfaffan differential equations, reduction of order, Riccati equations matrix Riccati equations, scale invariant equations. Exact Methods for PDEs, Backlund transformations, method of characteristics, characteristic strip equations, conformal mappings, method of descent diagonalization of a linear system of PDEs, Duhamel's principle, Exact Equations. Hodograph transformation inverse scattering Jacobi's method, Legendre transformation Lie Groups: PDEs Poisson formula Riemann's method, separation of variables, separable equations: Stackel matrix, similarity methods, exact solutions to the wave equation. Wiener-Hopf technique. Some Approximate Analytical Methods, Chaplygin's Method, Collocation, Equation Splitting, Graphical Analysis: The Phase Plane, Lyapunov Functions, Newton's Method, Pade Approximants, Perturbation Method, Reversion Method, Singular Solutions, Soliton-Type Solutions, Singular Solutions, Taylor Series Solutions, Variational Method, WKB Method.

Reference Books:
1. Handbook of Differential Equations, Daniel Zwillinger, Academic Press, Latest available.
2. Applied Partial Differential Equations, David Logan, Springer, 2014.
3. Advanced differential equations, M. D. Raisinghania, S. Chand & Company, 2014.
4. Partial Differential Equations for Scientists and Engineers, Stanley J. Farlow, Dover Publisher, 2012.
5. Introduction to Partial Differential Equations, K. SankaraRao, PHI limited, Latest available.
6. Chester, C.R., Techniques in Partial Differential Equations, McGraw-Hill Book Company, Latest available.