

# **MT-227 Differential Equations**

## **1<sup>st</sup> Order Differential Equations**

Basic concept; Formation of differential equations and solution of differential equations by direct integration and by separating the variables; Homogeneous equations and equations reducible to homogeneous form; Linear differential equations of the order and equations reducible to the linear form; Bernoulli's equations . Application in relevant Engineering: orthogonal trajectories: Numerical approximation to solutions ; Solution in series. Euler method, Euler modified method, Runge Kutta method of order 4.

## **2<sup>nd</sup> and Higher Orders Equations**

Special types of II nd order differential equations with constant coefficients and their solutions; The operator D; Inverse operator I/D ; Solution of differential by operator D methods; Special cases, Cauchy's differential equations; Simultaneous differential equations; simple application of differential equations in relevant Engineering.

## **Partial Differential Equation**

Basic concepts and formation of partial differential equations; Linear homogeneous partial differential equations and relations to ordinary differential equations; Solution of first order linear and special types of second and higher order differential equations; D' Alembert's solution of the wave equation and two dimensional wave equations; Lagrange's solution: Various standard forms.

## **Laplace Integral & Transformation**

Definition, Laplace transforms of some elementary functions, first translation or shifting theorem, second translation or shifting theorem, change of scale property, Laplace transform of the nth order derivative, initial and final value theorem Laplace transform of integrals. Laplace transform of functions  $\ln F(t)$  and  $F(t)/t$ , Laplace transform of periodic function, evaluation of integrals, definition of inverse Laplace transform and inverse transforms, convolution theorem, solutions of ordinary differential using Laplace transform.

## **Recommended Books**

- |                                                 |                    |               |
|-------------------------------------------------|--------------------|---------------|
| 1. Advance Engineering Mathematics              | Erwin kreyszig     | Seven Edition |
| 2. Differential Equation A modeling Perspective | Robert L. Barrelli | 1998          |
| 3. Introduction to Differential Equation        | J. Farlaw          | 1994          |
| 4. Differential Equation                        | G. Zill            |               |