

# **1 Partial Differential Equations**

## **1.1 First order PDEs**

Partial differential equations –Basic concepts and definitions. Formation of PDE, First order equations: classification and geometrical interpretation, Lagrange's and Charpit's method for solving PDE. Method of characteristics for obtaining general solution of quasi linear equations.

## **1.2 Higher order PDEs**

Partial differential equations of Second and higher order. Homogeneous and nonhomogeneous equations with constant coefficients.

## **1.3 Classification of second order PDEs and canonical forms**

Classification of second order linear equations as hyperbolic, parabolic or elliptic type. Reduction of second order linear equations to canonical forms.

## **1.4 The Cauchy-Kowalewskaya theorem**

The Cauchy problem, Cauchy-Kowalewskaya theorem, Cauchy problem of an infinite string, semi-infinite string. D'Alemberts solution. Domain of dependence, Range of influence. Method of separation of variables. Non homogeneous wave equation.