

# MTH166:DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

L:3 T:1 P:0 Credits:4

**Course Outcomes:** Through this course students should be able to

- Define and distinguished between different types of differential equations.
- Understand the use of different methods for the solution of differential equations.
- Apply the important concepts associated with derivatives of vector fields such as Gradient, divergence, curl, and scalar potential etc.
- Analyze the second-order partial differential equations such as the heat, wave and Laplace equation.
- Evaluate the line, surface, volume integral using various theorems of vector calculus.

## Unit I

**Ordinary differential equations** : exact equations, equations reducible to exact equations, equations of the first order and higher degree, Clairaut's equation

## Unit II

**Differential equations of higher order** : introduction to linear differential equation, Solution of linear differential equation, linear dependence and linear independence of solution, method of solution of linear differential equation- Differential operator, solution of second order homogeneous linear differential equation with constant coefficient, solution of higher order homogeneous linear differential equations with constant coefficient.

## Unit III

**Linear differential equation** : solution of non-homogeneous linear differential equations with constant coefficients using operator method, method of variation of parameters, method of undetermined coefficient, solution of Euler-Cauchy equation, simultaneous differential equations by operator method

## Unit IV

**Partial differential equation** : introduction to partial differential equation, method of Separation of Variables, solution of wave equation, solution of heat equation, solution of Laplace equation

## Unit V

**Vector calculus I** : limit, continuity and differentiability of vector functions, length of space curve, motion of a body or particle on a curve, gradient of a scalar field and directional derivatives, divergence and curl of vector field

## Unit VI

**Vector calculus II** : line integral, Greens' theorem, surface area and Surface integral, Stokes' theorem, Gauss's divergence theorem

## Text Books:

1. ADVANCED ENGINEERING MATHEMATICS by R.K.JAIN, S.R.K. IYENGER, NAROSA PUBLISHING HOUSE

## References:

1. HIGHER ENGINEERING MATHEMATICS by DR. B.S. GREWAL, KHANNA PUBLISHERS