

## **MT-221 Linear Algebra & Ordinary Differential Equations**

### **Linear Algebra**

Linearity and linear dependence of vectors, basis, dimension of a vector space, field matrix and type of matrices (singular, non- singular, symmetric, non- symmetric, upper, lower, diagonal), Rank of a matrix using row operations and special method, echelon and reduced echelon forms of a matrix, determination of consistency of a system of linear equation using rank, matrix of linear transformations, eigen value and eigen vectors of a matrix, Diagonalization. Applications of linear algebra in relevant engineering problem.

### **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 and orthogonal trajectories:  
Application in relevant Engineering.

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

Special types of  $n^{\text{th}}$  order differential equations with constant coefficients and their solutions: The operator  $D$ ; Inverse operator  $1/D$ ; 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.

### **Fourier Series**

Periodic functions and expansion of periodic functions in Fourier series and Fourier coefficients: Expansion of function with arbitrary periods. Odd and even functions and their Fourier series; Half range expansions of Fourier series.

### **Recommended Books**

- |   |                    |               |
|---|--------------------|---------------|
| 1. Elementary Linear Algebra                    | Howard Anton       | Seven Edition |
| 2. Advance Engineering Mathematics              | Erwin Kreyszig     | Seven Edition |
| 3. Differential Equation A modeling Perspective | Robert L. Barrelli | 1998          |
| 4. Introduction to Differential Equation        | J. Farlaw          | 1994          |
| 5. Differential Equation                        | G. zill            |               |