

### **318 M course syllabus.**

#### **Differential Equations. (4 hours 4- 0-2).**

**Textbook Differential Equations with Boundary-Value Problems.**

**By Dennis G. ZILL (Any edition).**

#### **Topics.**

- 1)** First-order differential equations, solutions and initial value. Existence and uniqueness of solutions, separable Equations, homogeneous equations, exact equations linear equations, special integrating factor for solving non exact equations, linear equations and Bernoulli's equations. Application (Growth and Decay, Newton's law of cooling}
- 2)** Linear differential equations of order n. General solutions of a homogeneous and non-homogeneous linear equations of differential equations with constants coefficient characteristic equation with different cases. The method of undetermined coefficients.
- 3)** Linear differential equations of order n. General solutions of a homogeneous and non-homogeneous linear equations of differential Equations with variable coefficients, reduction of order, Cauchy-Euler of homogeneous and non-homogeneous differential equations. The method of variation parameter.  
Series solutions of second linear differential equations with polynomial coefficients, solutions of linear system by using elimination method.
- 4)** Definition of Laplace transform, properties of Laplace transform, inverse Laplace transform, solving initial value problem, solving Linear system by using Laplace transform. Transform of discontinuous and periodic functions. Convolution, impulses, and Dirac delta function.
- 5)** Fourier series, standard formula, periodic functions, even and odd functions, Fourier sine and cosine series.

**Other text book as reference :** Differential Equations and Boundary Value Problems. By Nagle Saff Snider.

