

# MMA-C111

## ORDINARY DIFFERENTIAL EQUATIONS

MM : 100  
Time : 3 hrs  
L T P  
5 2 0

Sessional : 30  
ESE : 70  
Pass Marks : 40

**NOTE:** The question paper shall consist of two sections (Sec.-A and Sec.-B ). Sec.-A shall contain 10 short answer type questions of six marks each and student shall be required to attempt any five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

**The Existence and Uniqueness of solutions:** The method of successive approximation, Picard's Existence and Uniqueness theorem, Solution of linear differential equations of second order with variable coefficients, Applications to the vibrational mechanical systems.

**Power Series:** Power series solution, Ordinary and regular singular points, Series solution (Frobenius method) of first and second order linear equations,

**Legendre Polynomial:** Legendre's equation and its solution, Generating function for Legendre polynomials, Orthogonal properties of Legendre's polynomials, Recurrence relations, Rodrigue's formula

**Bessel Functions:** Bessel's equations and its solution and their recursion formulae, Integral representation and their properties.

**Hermite Polynomial:** Hermite equation and its solution, Generating Function for Hermite polynomials, Orthogonal property of Hermite Polynomial, Rodrigue formula for Hermite Polynomial, Recurrence Relation.

**Laguerre Polynomial:** Laguerre equation and its solution, Generating Function for Laguerre polynomials, Orthogonal property of Laguerre Polynomial, Rodrigue formula for Laguerre Polynomial, Recurrence Relation.

**Laplace transform,** Transform of elementary functions, Transform of Derivatives, Inverse Laplace transforms, Convolution theorem. Application of Laplace transform in solving ordinary differential equations.

### **Text /Reference Books**

1. G.F. Simmons, Differential equation with Applications and Historical Notes, Tata Mgraw Hill
2. W.I. Martin and E. Reissner, Elementary Differential Equations, Addison-Wesley Publishing Company
3. I. G. Petrovaski, Ordinary Differential Equations, Moscow State University publishing
4. I.N.Sneddon, A text book of Partial Differential Equations, McGraw-Hill
5. M.D.Raisinghania, Advanced Differential Equations, S.Chand Pub.