

Description	Subject Teaching Methodology	L	T	P	C
Course Code	MATHEMATICS-I	4	0	0	3
Teaching	Total contact hours 65				
Prerequisite (s)	Basic knowledge of algebra, trigonometry, differentiation and integration.				

### Course Objective(s):

1. To apply Laplace Transforms to solve Initial Value Problems and evaluate Infinite Integrals.
2. To solve first and higher order ordinary differential equations (ODE) with applications by various techniques.
3. To apply Partial Differentiation to solve Inequalities and to find Maxima and Minima.
4. To solve First and Higher order PDE with their applications to Heat equation, Wave equation, Laplace equation

### UNIT I Laplace transform

**Objective:** Application of Laplace Transform to Solution of IVP and Evaluation of Integrals  
Laplace transforms of standard functions-Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac’s delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Applications: Solutions of ordinary differential equations using Laplace transforms.(CO1)

### UNIT II: Differential equations of first order and first degree

**Objective:** Solution of First order and First degree ODE with applications  
Linear-Bernoulli-Exact-Reducible to exact.

Applications: Newton’s Law of cooling-Law of natural growth and decay-orthogonal trajectories. (CO2)

### UNIT III: Linear differential equations of higher order

**Objective:** Solution of Higher order Linear ODE with applications.

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , polynomials in  $x$ ,  $e^{ax} V(x)$ ,  $xV(x)$ .

Applications: LCR circuit, Simple Harmonic motion. (CO2)

### UNIT IV: Partial differentiation

**Objective:** Mean Value Theorems and their applications and to find Maxima and Minima

Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylors and Mc Laurent’s series for two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables with constraints and without constraints. (CO3)

### UNIT V: First order & Higher order Partial differential equations

**Objective:** Formation, Solution& application of First & Higher order PDE

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations.

Classification of II order PDE- Method of separation of Variables

Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.(CO4)

**Text Books:** 1. **UM. Swamy, P. Vijaya Lakshmi, R.V.G.Ravi Kumar, M.Phani Krishna Kishore** ,  
Engineering Mathematics 1<sup>st</sup> Edition, Anurag Jain for Excel Books  
2. **Dr.T.K.V.Iyengar, Dr.B.Krishna Gandhi, S.Ranganatham, M.V.S.S.N.Prasad**,  
1<sup>st</sup> Edition, S.Chand Publication  
3. **B.S.GREWAL**, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers

**Reference Books:**

1. **ERWIN KREYSZIG**, Advanced Engineering Mathematics, 9th Edition, Wiley-India
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
3. **GREENBERG**, Advanced Engineering Mathematics, 2nd edition, Pearson edn
4. **DEAN G. DUFFY**, Advanced engineering mathematics with MATLAB, CRC Press
5. **PETER O'NEIL** advanced Engineering Mathematics, Cengage Learning.

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