

Subject Code: 1ET1000301	Subject Title: Advanced Engineering Mathematics
Pre-requisite Subject	Calculus, Linear Algebra

Course Objective: To understand the applications of Laplace transform, Fourier series and Fourier integral, Ordinary Differential Equations and Partial Differential Equations. To apply mathematical concepts in various subjects of relevant branch.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total (T+P)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	2	-	5	70	30	--	--	100

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1.	Fourier Series and Fourier Integral: Periodic function, Trigonometric series, Fourier series, Functions of any period, Even and odd functions, Half-range Expansion, Applications: Forced oscillations, Fourier integral and its applications, Harmonic Analysis	08	19
2.	Laplace Transforms and Applications: Definition of the Laplace transform, Linearity, First Shifting theorem, Inverse Laplace transforms, Transforms of derivatives and integrals, Differentiation and integration of transforms, Convolution theorem and, Evaluation of integrals by Laplace transform, Laplace Transform of Periodic Functions, Unit Step Function, Dirac Delta Function, Second Shifting Theorem, Applications to Ordinary Differential Equations.	10	19
3	Ordinary Differential Equations and Applications: First order differential equations: Revision, Exact differential equations, Bernoulli equations, Higher Order Ordinary Differential Equations: Differential Operator D, Inverse Operator $\frac{1}{D}$, Symbolic Form, Solution of ODE, Complimentary Function, Particular Integral, Linear differential equations of higher order, Homogeneous linear differential equations, Wronskian, Euler-Cauchy Equations, Legendre's Differential Equation, Non homogeneous equations, Solution by undetermined coefficient, Solution by variation of parameters, Applications: Orthogonal Trajectories of Curves, Modeling of LCR Circuits, Free Oscillations.	12	29

4.	Partial Differential Equations (PDEs) and their Applications: Formation of PDEs, Solution of PDEs, Lagrange's PDE ,First order Non-Linear PDEs, Equations reducible to Linear, Charpit's method, Homogeneous Linear PDE with Constant coefficients, Classification of PDEs, Separation of Variables: Solution of Heat, Laplace and Wave Equations.	10	24
5.	Series Solution of Ordinary Differential Equations: Classification of Singularities, Solution by Power series method.	2	4

Course Outcome: Students will be able to apply engineering mathematics to engineering problems of their relevant branches after studying this course.

List of Reference Books:

1. Erwin Kreyszig: Advanced Engineering Mathematics, 8th Ed., John Wiley & Sons, India, 1999
2. Greenberg M D: Advanced Engineering Mathematics, 2nd ed., Pearson Education
3. W. E. Boyce and R. DiPrima, Elementary Differential Equations (8th Edition), John Wiley (2005)
4. Elements of Partial Differential Equations by Ian. N. Sneddon
5. Integral Transforms by M.D. Raisinghania