

MA201: ADVANCED ENGINEERING MATHEMATICS
CREDITS = 4 (L=4, T=0, P=0)

Course Objectives:

The basic necessity for the Foundation of Engineering & Technology being Mathematics, the main aim is, to teach Mathematical methodology, develop Mathematical skills & enhance thinking power of students.

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE	CE	ESE	CE	
4	0	0	4	70	30	0	0	100

Course Contents:

Unit No.	Topics	Teaching Hours
1	<u>Introduction to Some Special Functions:</u> Gamma function, Beta function, Error function and their properties.	08
2	<u>Laplace Transforms and Applications:</u> Definition of the Laplace transform, Inverse Laplace transform, Linearity property, Laplace transform of some standard functions, First Shifting theorem, Transforms of derivatives and integrals, solution to Differential equations, Differentiation and Integration of transforms, Unit step function, Second shifting theorem, Dirac's delta function, Convolution and integral equations.	15
3	<u>Fourier Series and Fourier integral:</u> Definitions of Sinusoidal Pulse function, Rectangle function, Gate function, Signum function, Saw tooth wave function, Triangular wave function, and Half wave rectified sinusoidal function, Full rectified sine wave, Square wave function. Periodic function, Fourier series, Functions of any period, Even and odd functions, Half-range Expansion, Fourier integral.	12

4 **Ordinary Differential Equations and Applications:** 15

Introduction of differential equations, Linear differential equations of higher order: Definition of Higher order linear differential equations, Higher order homogeneous with constant coefficients, Higher order non homogeneous equations with constant coefficients. Solution by $[1/f(D)]r(x)$ method for finding particular integral. Finding particular integral using shortcut methods, Wronskian, method of variation of parameters, solution to Euler-Cauchy equations, and solution to Legendre's equation.

5 **Series Solution of Differential Equations:** 10

Ordinary point, singular points, regular singular points, Power series method, Theory of power series methods, Frobenius method.

TOTAL 60

List of References:

1. Grewal, B. S., "*Higher Engineering Mathematics*", Khanna Publisher, New Delhi.
2. Kreyszig, E., "*Advanced Engineering Mathematics*", Wiley-India.
3. Boyce, W.E. and Di Prima, R., "*Elementary Differential Equations*", John Wiley.
4. Bali, N.P. and Manish Goyal, "*A Textbook of Engineering Mathematics*", Laxmi Publications Pvt. Ltd.
5. Dass, H.K. "*Advanced Engineering Mathematics*", S. Chand Publishing.

Course Outcome (COs):

On successful completion of the course, students will be able to:

1. Do expansion of functions in terms of basic trigonometric functions.
2. Analyze differential equations.
3. Solve differential equations by using tool like Laplace transform, Fourier series and series solution.
4. Create a modelling of engineering problems.