

	National Institute of Technology Meghalaya An Institute of National Importance											CURRICULUM				
Programme	Bachelor of Technology										Year of Regulation			2024-25		
Department	Mathematics										Semester			II		
Course Code	Course Name	Pre-requisite	Credit Structure										Marks Distribution			
			L	T	P	C	INT	MID	END	Total						
MA 102	Engineering Mathematics-II	NIL	3	1	0	4	50	50	100	200	CO's	Statement				Bloom's Taxonomy
Course Objectives	1. To introduce the fundamental concepts of various engineering mathematics tools involving integral transforms, differential equations and complex variables.	Course Outcomes	MA102.1	Able to describe the basic concepts of Fourier series, Fourier transform, Laplace transform and their applications.										Understand		
			MA102.2	Able to solve ordinary differential equations analytically and implement the ODEs to model real world problems.										Apply		
	MA102.3		Able to compare second order PDEs and solve Laplace, heat and wave equations using Fourier series.										Analyze Apply			
	MA102.4		Able to recognize analytic functions, solve contour integrals and determine the Taylor and Laurent series expansions.										Understand Apply			
	MA102.5		Able to use the basic knowledge of engineering Mathematics in solving real-world problems .										Apply			
	MA102.6		Able to apply Gauss' divergence theorem, Stokes' theorem and Green's theorem to evaluate double and triple integrals										Apply			
COs	Mapping with Program Outcomes (POs)												Mapping with PSOs			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
MA102.1	3															
MA102.2	3															
MA102.3	3															
MA102.4	3															
MA102.5	3															
MA102.6	3															
MA102	3															
SYLLABUS																
No.	Content												Hours		COs	
I	Integral Transforms: Fourier series of a function with arbitrary period, Fourier series of even and odd functions, half-range Fourier series, Fourier Transform: Fourier integral theorem, Fourier sine and cosine integrals, complex form of Fourier integral, Fourier transform of derivative of a function, applications of Fourier transform in boundary value problems; Laplace Transform: Laplace transform of a function, existence theorem, Laplace transform of derivatives and integrals, inverse Laplace transform, convolution theorem.												13		MA102.1 MA102.5	
II	Ordinary Differential Equations: First order ordinary differential equations: exact, integrating factors, linear and Bernoulli's equations, Higher order differential equations with constant coefficients, Cauchy-Euler equations, method of variation of parameters, system of differential equations. Use of Laplace and Fourier transform in solving ordinary differential equations.												12		MA102.2 MA102.5	
III	Partial Differential Equations: First order partial differential equation: linear, semi-linear, quasi-linear, and non-linear types. Classification of integrals. Lagrange's method of solution and its geometrical interpretation, compatibility condition, Charpit's method, special types of first order equations. Method of separation of variables to solve Wave equation, Laplace equation, Heat equation. Use of Laplace and Fourier transform in solving partial differential equations.												13		MA102.2 MA102.5	
IV	Complex Analysis: Basic concept of complex numbers, limits, continuity and differentiability of a complex valued function of a complex variable, analytic functions, Cauchy-Riemann Equations, harmonic functions, complex exponential, trigonometric, hyperbolic and logarithmic functions, line integral in complex plane, Cauchy's Integral Theorem, Cauchy's Integral Formula, Taylor and Laurent series, singularities.												12		MA102.4 MA102.5	
V	Vector Calculus: Gradient, divergence, curl; Green's theorem; Gauss' divergence theorem; Stokes' theorem.												06		MA102.6	
Total Hours (5 Modules)												56				
Essential Readings																
1. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 10 th edition 2023.																
2. R. K. Jain and S. R. K. Iyengar, "Advanced Engineering Mathematics", Narosa Publishing House, 5 th edition, 2019.																

Supplementary Readings
1. P. Dyke, "An Introduction to Laplace Transforms and Fourier Series", Springer Nature; 2 nd edition, 2014.
2. Shepley L. Ross, "Differential Equations", John Wiley & Sons, Inc, 3 rd edition 2007.
3. S. J. Farlow, "Partial Differential Equations for Scientist and Engineers", Dover Publications, 2003.
4. J. W. Brown and R. V. Churchill, "Complex Variables and Applications", McGraw Hill; 9 th edition, 2021.