National Institute of Technology Meghalaya

An Institute of National Importance

CURRICULUM

Programme	**Bachelor of Technology**	Year of Regulation	**2017-18**
Department	**Mathematics**	Semester	**II**

Course Code	Course Name	Pre-requisite	Credit Structure				Marks Distribution			
			L	T	P	C	INT	MID	END	Total
MA102	**Integral Calculus and Complex Variables**	**NIL**	**3**	**1**	**0**	**4**	**50**	**50**	**100**	**200**

Course Objectives	To introduce the fundamental concepts and techniques of integral calculus of single and multi variables, vector calculus and theory of complex variables, and to develop problem solving and critical thinking skills.	Course Outcomes	CO1: Able to apply definite integrals to evaluate length of plane curves; to determine volume and surface area of solids of rotation
			CO2: Able to understand the concepts of improper integrals and their convergence properties
			CO3: Able to apply the knowledge of multiple integrals to solve problems related to areas, volumes, etc
			CO4: Able to apply Gauss' divergence theorem, Stokes' theorem and Green's theorem to evaluate double and triple integrals
			CO5: Able to understand complex numbers, the algebra and geometry of complex numbers, complex plane and analytic functions
			CO6: Able to evaluate contour integrals by using Cauchy's Integral Theorem, Cauchy Integral Formulae, Residual Theorem

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
1	CO1	**3**														
2	CO2	**3**														
3	CO3	**3**														
4	CO4	**3**														
5	CO5	**3**														
6	CO6	**3**														

SYLLABUS

No.	Content	Hours	COs
I	**Integral Calculus:** Definite integral: length of a plane curve, surface area of revolution, volume of solids of revolution; Differentiation under sign of integral: Leibnitz rule; Improper integrals, convergence tests, beta and gamma functions; Multiple Integrals: double and triple integrals, volume and surface integrals.	**21**	**CO1**, **CO2**, **CO3**
II	**Vector Calculus:** Gradient, divergence, curl; line and surface integrals; Green's theorem; Gauss' theorem; Stokes' theorem.	**11**	**CO4**
III	**Complex Variables:** Analytic functions, Cauchy-Riemann equations, harmonic functions; Line integrals, Cauchy's integral theorem, Cauchy's integral formula; Power series, Taylor and Laurant series; Poles and residues, Cauchy's residual theorem.	**16**	**CO5**, **CO6**
Total Hours		**48**	

Essential Readings

1. J. Stewart, "Calculus", Cengage Learning India Pvt. Limited, 7th edition, 2017.
2. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 10th edition 2015.

Supplementary Readings

3. R. K. Jain and S. R. K. Iyengar, "Advanced Engineering Mathematics", Narosa Publishing House, 5th edition, 2016.