Course Outcome(s)	Represent complex numbers algebraically and geometrically, Define and analyze limits and continuity for complex functions as well as consequences of continuity, Apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on Harmonic and entire functions including the fundamental theorem of algebra. Analyze sequences and series of analytic functions and types of convergence, Evaluate complex contour integrals directly and by the fundamental theorem, apply the Cauchy integral. Theorem in its various versions, and the Cauchy integral formula, and Represent functions as Taylor, power and Laurent series, classify singularities and poles, find residues and Evaluate complex integrals using the residue theorem.

Syllabus:

Conformal mapping, Linear transformations, cross ratio, symmetry, oriented circles, families of circles, use of level curves, elementary mappings and Riemann surfaces.

Complex integration, rectifiable curves, Cauchy's integral theorems for rectangle and disc, Cauchy's integral formula, higher derivatives. Local properties of analytic functions, removable singularities, Taylors theorem, Taylor series and Laurent series, zeroes and poles, local mapping, the maximum principle. Chains and cycles, simple connectivity, locally exact differentials, multiply connected regions, residue theorem, argument principle, evaluation of definite integrals

Harmonic functions, mean value property, Poissons formula, Schwarz theorem, reflection principle, Weierstrass theorem.

Text books:

1. L.V. Ahlfors, Complex Analysis, Third Edition Mc-Graw Hill International, 1979. 2. H. A. Priestley, Introduction to Complex Analysis, Oxford University Press, 2003.

References:

1. John M. Howie, Complex Analysis, Springer Science & Business Media, 2003. 2. John B. Conway, Functions of One Complex Variable I, Springer Science & Business Media, 1978.

3. J. Brown and R. Churchill, Complex Variables and Applications, McGraw-Hill Education, 2013.
4. V. Karunakaran, Complex Analysis, CRC Press, 2005.
5. Dennis G. Zill, Patrick Shanahan, Patrick D. Shanahan, A First Course in Complex Analysis with Applications, Jones & Bartlett Learning, 2006.

Code:MAT5203: Measure and Integration	L	T	P	Credit

Prerequisites: Basic knowledge of differentiation, integration and continuity of real functions	4	1	0	4

Course Category	Core

Course Type	Theory
Course Objective	Knowledge gained about Lebesgue theory and general measure spaces and their properties and construction.
Course Outcome(s)	On completion of the module a student should be able to know and understand the concept of a sigma-algebra and a measure; understand the concept of the Lebesgue measure and almost everywhere prevailing properties; Begin with Understanding integration in a general setting using measures; Understand the Radon-Nikodym theorem and relation between convergence of Lebesgue integrals and pointwise convergence of functions, products measures and Fubini's theorem.

Syllabus:

Review of Riemann Integral, Lebesgue Measure; Lebesgue Outer Measure; Lebesgue Measurable Sets. Measure on an Arbitrary Sigma- Algebra; Measurable Functions; Integral of a Simple Measurable Function; Integral of Positive Measurable Functions.

Lebesgue's Monotone Convergence Theorem; Integrability; Dominated Convergence Theorem; Lp- Spaces. Signed Measures and the Hahn -Jordan Decomposition- Radon-Nikodym theorem and its applications. Differentiation and Fundamental theorem for Lebesgue integration Product measure; Fubini's theorem

Text books:

1. G. de Barra, Measure and Integration, 2nd Edition, New Age International publications, 2013. 2. H.L. Royden, Real Analysis, 3rd Edition, Prentice-Hall of India, 1995.

References:

1. W. Rudin, Real and Complex Analysis, Third edition, McGraw-Hill, International Editions, 1987.
2. Inder K. Rana, An Introduction to Measure and Integration, American Mathematical Society, 2005.
3. P. R. Halmos, Measure Theory, Van Nostrand, 1950.
4. D.L. Cohn, Measure Theory, Birkhauser, 1997.
5. P.K. Jain and V.P. Gupta, Lebesgue Measure and Integration, New Age International, 2006.

Code:MAT5204: Multivariable Calculus Prerequisites: Linear Algebra, Single variable Calculus	L	T	P	Credit
	4	1	0	4

Course Category	Core
Course Type	Theory
Course Objective	The objective is to enable the students to develop a clear understanding of the fundamental concepts of multivariable calculus and a range of skills such as the ability to compute derivatives using the chain rule, ability to set up and solve optimization problems involving several variables, with or without constraints, ability to set up and compute multiple integrals in rectangular, polar, cylindrical and spherical coordinates, allowing them to work effectively