

Subject Code: 1SC2040101	Subject Title: COMPLEX ANALYSIS-I
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Course Objective:

- This is an introductory course in complex analysis which provide a working knowledge of the basic definitions and theorems of the differential and integral calculus of functions of a complex variable and know the similarities and differences between real and complex analysis.

Teaching scheme (hours) per week		Credit			Theory Marks		Practical Marks		Total
Lecture	Tutorial	Theory	Practical	Total	Uni. Assessment	Cont. Assessment	Uni. Assessment	Cont. Assessment	
4	1	5	-	5	60	40	--	--	100

Subject Contents			
Unit. No	Topic	Total Hours	Weight (%)
1	A quick overview of complex number system, polar representation and roots of complex numbers, the extended plane and its spherical representation, elementary functions and properties.	18	25
2	Continuity, derivatives, Cauchy-Riemann equations, C-R equation in polar coordinates and complex form, analytic functions, harmonic functions, power series, power series as an analytic function, branch of logarithm - its analyticity, analytic functions as mappings.	18	25
3	Contours, contour integrals, anti-derivative, Zeros of an analytic functions, Cauchy's theorem, simply and multiply connected domains and Cauchy's Integral Formula, Cauchy inequality, Liouville's theorem, Fundamental theorem of Algebra, Morera's theorem, Cauchy's theorem and simple connectivity, Goursat's theorem. Gauss mean value theorem, Principle of deformation of paths, Maximum modulus principle.	18	25
4	Taylor's theorem, Laurent series, absolute and uniform convergence of power series. Classification of singularities, residues, residues theorem, residues at poles, evaluation of improper real integrals, definite integrals with sine and cosine function, Schwarz's reflection principle, Mobius transformation.	18	25

Course Outcome:

On successful completion of the course, students should be able to

- Develop facility with complex numbers and the geometry of the complex plane culminating in finding the n th roots of a complex number.
- Set up and directly evaluate contour integrals
- Identify and classify zeros and singular points of functions.

List of References:

- Conway, J.B., Functions of One Complex Variable, (Second Edition), Narosa Publ. House, NewDelhi, 1994.
- Churchil, R.V., Brown, J. and Verle, R., Complex Variables and Applications, McGraw-Hill Publ.Co., 1974.
- Ponnusamy, S., Foundations of Complex Analysis, Narosa Publ. House, New Delhi, 1995.
- Choudhary, B., The Elements of Complex Analysis, (Second Edition), Wiley Eastern Ltd., NewDelhi, 1992