20MSM507T					Complex Analysis					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs. / Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	--	--	100

COURSE OBJECTIVES

- To equip students with necessary knowledge and skills of complex functions.
- To enable students handle mathematical operations, analyses and problems involving complex numbers.
- To make students understand the role of singularities and their consequences.
- To enable students apply Weierstrass factorization theorem to a suitable class of complex functions.

UNIT 1 COMPLEX DIFFERENTIATION **11 Hrs.**

The extended plane and its spherical representation, elementary properties and examples of analytic functions, Power functions, analytic functions as mappings, zeroes of analytic functions, Conformal mappings, Mobius transformations, branch of logarithm.

UNIT 2 EXPANSION OF FUNCTIONS AND ANALYTIC CONTINUATION **09 Hrs.**

Taylor and Laurent series expansion of complex functions , Mittag-Leffler theorem, Weierstrass factorization theorem, Analytic continuation.

UNIT 3 COMPLEX INTEGRATION **12 Hrs.**

Rieman - Stieltjes integrals, The index of a closed curve, Cauchy Theorem and integral formula, The homotopic version of Cauchy's Theorem and simple connectivity, Counting zeroes, The open mapping theorem, Goursat's Theorem, Liouville's theorem, Morera's theorem, Maximum modulus theorem.

UNIT 4 SINGULARITIES AND THEORY OF RESIDUES **08 Hrs.**

Singularities, Classification of singularities, Residues, The argument principle, Cauchy Residue theorem, Applications of residues- evaluating real integrals (three cases), Summation of series.

40 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Define various transformations identified in complex scenario.
CO2 – Understand the concept analytic functions and illustrate contour integration to complex functions.
CO3 – Apply appropriate tool/method to extract the solutions to practical problems.
CO4 – Analyze the obtained solution in context with theory.
CO5 – Appraise mathematical problems from real to complex domain.
CO6 – Formulate problems on factorization of entire functions.

TEXT/REFERENCE BOOKS

1. J. W. Brown, R. V. Churchill, Complex Variables and Applications, McGraw Hill, 2009.
2. W. Kaplan, Introduction to Analytic Functions, Addison-Wesley, 1966.
3. H. S. Kasana, Complex Variables: Theory and Applications, Prentice Hall, 2005.
4. Lar's V. Ahlfors , Complex Analysis, 3rd ed., Mc Graw Hill, 1988.
5. John H. Mathew and Russel, W.Howell, Complex analysis for Mathematics and Engineering, 3rd ed., Jones and Bartlett publishers, 1977.