

MA-309: COMPLEX ANALYSIS

Algebra of complex numbers, analytic functions, C-R equations, harmonic functions, elementary functions, branches of $\log z$, complex exponents.

Integrals: Contours, Cauchy-Goursat theorem, Cauchy integral formula, Morera's theorem, maximum moduli of functions, Liouville's theorem, fundamental theorem of algebra.

Series: Convergence of sequences and series, Taylor series, Laurent series, uniqueness of representation, zeros of analytic function.

Residues and poles: the residue theorem, evaluation of improper integrals, integrals involving trigonometric functions, integration around a branch point.

Mapping by elementary functions: linear functions, the function $1/z$, the transformations $w = \exp(z)$ and $w = \sin(z)$, successive transformations. Analytic continuation, the argument principle, Rouché's theorem.

RECOMMENDED BOOKS:

1. Churchill, R.V. Verhey and Brown R., Complex Variables and Applications McGraw-Hill, 1996.
2. Marsden, J.E., Basic Complex Analysis, W.H. Freeman and Co, 1982.
3. Hille, E., Analytic Function Theory, Vols.I and II, Chelsea Publishing Co. New York, 1974.