MA 407: COMPLEX ANALYSIS (3-1-0:4)

Analytic functions, power series, arcs and closed curves, analytic functions in regions, conformal maps, Möbius transformations.

Line integral, rectifiable arcs, Cauchy's theorem for a rectangle, Cauchy's theorem in a disk, Cauchy's integral formula: The index of a point with respect to a closed curve, the integral formula, higher derivatives, Liouville's theorem. Applications of Cauchy's integral formula: identity principle, the maximum principle, open mapping theorem, Morera's theorem.

Local properties of analytic functions: singularities, Taylor's theorem, zeros and poles, Laurent's series, general form of Cauchy's theorem, chains and cycles, simple connectivity, homology, proof of Cauchy's theorem, locally exact differentials, multiply connected regions.

Calculus of residues: residue theorem, argument principle, evaluation of definite integrals.

The space of analytic functions, convergence of sequences of analytic functions, normal families and Montel's theorem.

Text Books and References:

1. J. B. Conway, "Functions of One Complex Variable", Narosa Publishing House
2. W. Rudin, "Real and Complex Analysis", McGraw Hill Education (India) Pvt. Ltd
3. Z. Nehari, "Introduction to Complex Analysis", Literary Licensing, LLC
4. L. V. Ahlfors, "Complex Analysis", McGraw Hill Education