COMPLEX ANALYSIS
Full Marks - 50
(60 hours)

1. Analytic Functions, Cauchy-Riemann equations and its applications.

3. **Complex Integration :** Basic idea, ML-inequality, Winding number or Index of a curve, Cauchy-Goursat Theorem for simply-closed contour & for closed polygon. Cauchy Integral formula. Derivatives of an analytic function. Morerea's theorem. Necessary & sufficient condition for a function to be analytic in a convex domain. Mean value Theorem, Liouville's theorem, The Fundamental theorem of Algebra. Evaluation of some integrals.

4. **Uniform Convergence of sequence of functions and series of functions :** deduction of special properties of the limit function and of the sum function respectively with special reference to their analyticity. Power series-uniform convergence. A power series represents an analytic function inside its circle of convergence.

5. Taylor's series and Laurent's expansion. Zeros and Poles – basic results. Isolated singularities. Relation between zeros and poles. Zeros are Isolated points and are finite in number. Riemann's theorem.

6. Maximum Modulus Theorem, Minimum Modulus Theorem, Schwarz lemma.

7. **Residue :** Determination of Residue, Residue theorem, Evaluation of integrals. Application of logarithmic residue theorem. Meromorphic function. The Argument principle.

8. Rouche's theorem and its application. Open mapping theorem. Hurwitz Theorem

9. Branches of many valued functions with special reference to arg z, log z and z^a.

10. Linear functional transformation and conformal mapping,

References

1. Complex variables – Theory & applications – H.S. Kasana (PHI)
2. Applied complex Analysis – Rubenfeld
3. Complex Variables – Spiegel (Schaum series)
4. The Theory of function – Titchmarsh, E.C.
5. Foundations of complex Analysis – S. Ponnusamy (Narosa)
6. Function of One Complex Variable : J B Conway
7. Complex Analysis – T W Gamalin (Springer)
8. Complex Analysis – L V Ahlfors (TMH)
9. Real and Complex Analysis – W Rudin (TMH)
10. Complex Functional Theory – D E Sorason (HBA)
11. Complex Analysis in One Variable - Raghavan Narsimham, Springer.