Paper VII: Real and Complex Analysis

IV. Real Analysis:

Reimann Integration: Recapitulation of real number system, postulates and their consequences, inequalities and absolute values, lower and upper bounds. The upper and lower sums, necessary and sufficient conditions for integrability. Algebra of integrable functions. Integrability of continous and monotonic functions. Fundamental theorem of calculus, change of variables. Integration by parts. The first and second mean value theorems of integral calculus.   **17 Hrs**

II Complex Analysis:

Recapitulation of complex numbers and complex plane, conjugate and modulus of a complex number. The polar form, geometrical representation, Euler's formula $e^{i\theta}=CiS\theta$. Function of complex variable: Limits, continuity and differentiability. Analytic functions, Cauchy-Reimann equations in Cartesian and polar forms. Sufficient conditions for analyticity (in Cartesian form). Real and imaginary parts of analytic functions which are harmonic. Construction of analytic function given real and imaginary parts.   Some standard transformation: Conformal transformation, special conformal transformation. The complex line integral: examples and properties (definitions of the concepts like Neighborhood of a point, closed contour etc. at appropriate places should be mentioned.) Cauchy integral theorem (statement) and its consequences. The Cauchy's integral formulae for the function and its derivatives, applications to the evaluation of simple line integrals.   **35Hrs**

Note: Internal Marks-25.

References:

1. S C Malik: Mathematical Analysis (New Age International Pvt Ltd).
2. Sharma and Vasistha: Real Analysis (Krishna Prakashan Mandir, Meerut).
3. Churchill R V : Introduction to complex variables and applications (Mcgraw Hill)
4. Murry R Spiegel : Complex Variables (Schaum's Outline series)
5. Choudhary B: The elements of complex analysis (New Age International Pvt Ltd).
6. L.V. Alhfors : **Complex Analysis:** An Introduction to The Theory of Analytic Functions of One Complex Variable (Mcgraw Hill)