

IT-779: Proforma for course plan

- Course Name : **Advanced Applied and Computational Complex Analysis**
- Course Code: IT-779 : Ph.D
- Credit: 3 Credits
- Course offered to: Optional

- Course description: This course will fulfill the need of mathematical applications in Advance complex analysis as well as computational method to understand complex variables. The aim of this course is enhance the knowledge and understanding of the students for developing new mathematical real world problems for complex variables and functions and their solutions.

- Pre-requisite (Mandatory): Student should be able to understand mathematics at the +2 level.

- Pre-requisite (Desirable): Nil

- Course Outcome (COI-5):

Students should be able to understand:

Complex Variables, Complex functions and applications in biological systems. This topic will introduce the formulation of Complex Variable, limit continuity and differentiability of complex variables. Complex integral and its use in real word problems along with their solutions with applications.

Tentative teaching plan:

Week number	Lecture topic	CO met
1-3	Function of Complex Variable, Limit of Complex Variable, Continuity of complex Variable. Differentiability of Complex Variable. Analytic Function. Cauchy-Riemann Equations. Harmonic Functions, Conjugate Functions. Milne's Thomson Method (Applications).	CO1
4-6	Complex Integration, Cauchy's Integral Theorem, Cauchy's Integral Formula, Cauchy's Integral formula for the Derivatives, Cauchy's Inequality, Liouville's Theorem. Rouché's Theorem, Fundamental theorem of Algebra (Applications).	CO2
7-9	Power Series, Radius of convergence of Power Series, Series of Complex terms, Taylor's Series. Laurent's Series (Applications).	CO3
10-12	Zero of an Analytic Function, Singularity, Types of Singularity, Poles. Types of Poles, Residue. Cauchy's Residue Theorem, Methods of finding Residue (Applications).	CO4
12-14	Contour Integration, Residue theorem to evaluate integrals, Complex Integrals when no zeroes on the real axis, Complex Integrals when zeroes are on the real axis, Jordan's Inequality, Jordan's Lemma (Applications).	CO5

References:

1. Current Topics in Pure and Computational Complex Analysis-Santosh Joshi, Michael Dorff, Indrajit Lahiri
2. Applied and Computational Complex Analysis-Peter Henrici
3. Higher Engineering Mathematics- B. S. Grewal
4. Complex Analysis with Applications — Richard A. Silverman
5. Introductory Complex Analysis - Boris Vladimirovich Shabat -
6. Invitation to complex analysis- Ralph P. Boas, Harold P. Boas
7. Complex Analysis for Mathematics and Engineering-John Mathews, Russell Howell -
8. A Complex Analysis Problem Book-Daniel Alpay
9. Fundamentals and Applications of Complex Analysis- Harold Cohen
10. Complex Analysis with MATHEMATICA-O-William T. Shaw
11. Complex Analysis-Man Wah Wong
12. A First Course in Complex Analysis with Applications-Zill