

Course Code	Course Title	C	H	I	E	T
17U6MMC11	Complex Analysis	4	4	25	75	100

Learning Objectives

To provide a strong foundation in fundamental concepts of Complex Analysis which will enrich them to have a good knowledge to apply in real life problems.

Learning Outcomes

On satisfying the requirement of this course, students will

Determine whether the given function is Continuous / differentiable / analytic, and find the derivative of a function.

- Use Cauchy's integral theorem and formula to compute line integrals.
- Find the Taylor's series of a function and determine its circle or annulus of convergence.
- Classify singularities, examine the theory, compute the residue of a function and able to apply the concepts of the calculus of residues in the evaluation of integrals.

Unit I Analytic Functions

Functions of complex variable – Limits – Theorems on limit – Continuous functions – Differentiability – The Cauchy-Riemann equations – Analytic functions – Harmonic functions.

Unit II Bilinear Transformations

Elementary transformations – Bilinear transformations – Cross ratio – Fixed points of bilinear transformations.

Unit III Complex Integration

Definite integral – Cauchy's theorem – Cauchy's integral formula – Higher derivatives – Problems.

Unit IV Series Expansions

Taylor's series – Laurent's series – Zeros of an analytic function – Singularities.

Unit V Calculus of Residues

Residues – Cauchy's residue theorem – Argument theorem – Rouché's theorem – Fundamental theorem of Algebra.

Text Book:

S. Arumugam, A. T. Issac and A. Somasundaram, Complex Analysis, Reprint 2010, Scitech Publications (India) Pvt. Ltd.

Chapters: 2 (2.1 – 2.8), 3 (3.1 – 3.4), 6 (6.1 – 6.4), 7 (7.1 – 7.4), 8 (8.1, 8.2).

Reference Books:

1. T. K. ManickavachagomPillay, S. P. Rajagopalan and R. Sattanatham, Complex Analysis, 2007 Edition, S. ViswanathamPrinters & Publishers.
2. Narayanan and T. K. ManickavachagomPillay, Complex Analysis, 1997 Edition, S. ViswanathamPrinters & Publishers.