

CURRICULUM TRANSACTIONAL STRATEGY

MMT-C 402: Complex Analysis-II

Prerequisites: Real Analysis-I and Complex Analysis-I

COURSE OBJECTIVES

- To understand the modulus of a Complex valued function and results regarding that
- To Understand and develop manipulation skills in the use of Rouché's theorem.
- To Understand certain theorems like Inverse Function theorem, Hadamard's three circle theorem.
- To understand and learn to use Argument Principle.
- To understand the principle of Analytic Continuation and the concerned results.
- To study the functions with positive real part.
- To understand Gamma and Zeta functions, their properties and relationships.
- To understand the Harmonic functions on a disc and concerned results.
- To understand the factorization of entire functions having infinite zeros.
- To understand range of analytic functions and concerned results.
- To understand univalent functions.

COURSE OUTLINE

UNIT I

- Maximum Modulus principle and Schwarz Lemma.
- Argument Principle and Rouché's theorem.
- Inverse function theorem, Poisson Jensen formula.
- Hadamard's three circle theorem.
- Theorem of Borel and Carathéodory.

UNIT II

- Analytic continuation and its uniqueness.
- Uniqueness of Analytic continuations along a curve.
- Power series method of analytic continuation.
- Functions with natural boundaries.
- Reflection principle and Monodromy theorem.

UNIT III

- Space of Analytic functions.
- Factorization of entire functions and Weierstrass factorization theorem.
- Gamma and zeta functions.
- Harmonic functions and Dirichlet's problem
- Green's functions

UNIT IV

- Canonical product, order and exponential convergence of entire functions.
- Range of analytic functions.
- Picards theorems.
- Univalent functions and $\frac{1}{2}$ theorem.
- Bloch's theorem and Landau's theorem.

Classroom Transaction

Unit	Topic	Activity	No. of Tutorials	No. of lectures
I	Maximum Modulus principal and Schwarz Lemma.	Assignment	03	05
	Argument Principle and Rouche' theorem.	Assignment	02	03
	Inverse function theorem, Poission Jensen formula.	Assignment	01	04
	Hardmard's three circle theorem.	Assignment and Presentation	01	02
	Theorem of Borel and Caratheodary.	Assignment	00	01

Unit	Topic	Activity	No. of Tutorials	No. of lectures
	Analytic continuation and its uniqueness.	Assignment	03	03
	Uniqueness of Analytic	Assignment	01	01
Unit	Topic	Activity	No. of	No. of
II		Presentation		
	Power series method of analytic continuation.	Assignment	01	02
	Functions with positive real part	Assignment	01	03
	Reflection principle and Monodramy theorem	Assignment	02	04

			Tutorials	lectures
III	Space of Analytic functions.	Assignment	02	05
	Factorization of entire functions and Weistrass factorization theorem.	Assignment	01	02
	Gamma and zeta functions	Assignment and Presentation	02	06
	Harmonic functions and Drichlets problem	Assignment	02	04
	Greens function	Assignment	01	01

Unit	Topic	Activity	No. of Tutorials	No. of lectures
IV	Canonical product, order and exponential convergence of entire functions.	Assignment	01	03
	Range of Analytic functions	Assignment	02	05
	Picard's thoerems	Assignment	01	04
	Univalent functions and $\frac{1}{4}$ theorem.	--	01	01
	Bloch's theorem and Landau's theorem.	Assignment and Presentation	03	03

Text Books:

1. J.B. Conway, Functions of one Complex variable.
2. L. Ahlfors, Complex Analysis
3. E.C. Titchmarsh, Theory of functions.

Reference Books:

1. S. Lang, Complex Analysis.
2. E. Hille, Analytic function theory.