Semester VIII

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Complex Analysis and Algebra DSC-20	**4**	**3**	**1**	**0**	**12th Pass**	**Calculus, Linear Algebra**

Learning Objectives

This interactive learning module intends to provide capabilities and basic understanding of complex analysis and algebra. The primary objective of this course is to introduce the basic tools of complex numbers, analytic functions, Laurent expansions and complex integration to understand their connection with the real-world problems. The second part of this course deals with introduction to group theory and its applications.

Learning outcomes

- Understanding the significance of limit, continuity and differentiability of complex numbers
- Evaluate integrals along a given path and functions.
- An introduction to the fundamentals of group theory
- Visualization of the applications of group theory

SYLLABUS

Unit I: Functions of complex variable - Derivatives, differentiation formulas - Cauchy- Riemann equations - sufficient conditions for differentiability - Analytic functions of a complex variable: Power- series expansions, Laurent expansions and Liouville's theorem. **(12 hours)**

Unit II: Complex integration - Cauchy Integral Theorem - Residue Theorem and applications to evaluate real integral **(12 hours)**

Unit III: Sets, relations, functions - Groups, subgroups - Permutations – Cyclic notation of permutation – Even and odd permutations - Permutation groups –

Alternating groups – Subgroups **(12 hours)**

Unit IV: Lagrange's theorem and its consequences – Cyclic and Abelian groups – Centralizer and normalizer of a group **(12 hours)**

Essential/recommended readings

1. Complex Variables and Applications, J.W. Brown and R. V. Churchill, McGraw Hill (8th Edition), 2009.
2. Contemporary Abstract Algebra, J. A. Gallian, (8th Edition), Cengagae Learning, 2013.
3. An Introduction to Theory of Groups, J. J. Rotman,(4thEdition), Springer,1995.