Course Type	CourseCode	Nameof the Course	L	T	P	Credits
DE	NMCD538	**Algebraic Number Theory**	3	0	0	3

CourseObjective
To give a thorough understanding of the algebraic number fields and their rings of integers andto study ideals of the ring of integers, the class group and units. This course provides a foundation for studies in algebraic number theory and is an essential ingredient of some other areas of algebra and arithmetic geometry.
LearningOutcomes
Students will be able to demonstrate understanding of basic algebraic number theoretic concepts and will be able to demonstrate the ability to explain proofs of, and identify core ideas behind, the major foundational results of algebraic number theory. In addition, students will have the ability to pursue further studies in number theory and related areas.

Unit No.	Topicsto beCovered	Lecture Hours	LearningOutcome
1	Algebraic number fields. Localisation, discrete valuation rings.	7	Student will able to understand the properties of algebraic number fields.
2	Integral ring extensions, Dedekind domains, unique factorisation of ideals. Action of the Galois group on prime ideals.	8	This unit help students to understand ring extensions, Dedekind domains and action of Galois groups.
3	Valuations and completions of number fields, discussion of Ostrowski's theorem, Hensel's lemma, unramified, totally ramified and tamely ramified extensions of p-adic fields.	11	Students will learn about the completions and different types of ramified extensions.
4	Discriminants and Ramification, Cyclotomic fields, Gauss sums, quadratic reciprocity.	10	Students will learn the discriminants, different properties of Cyclotomic fields and law of reciprocity.
5	The ideal class group, finiteness of the ideal class group, Dirichlet units theorem.	6	This unit help students to understand the proofs of finiteness of the ideal class group, Dirichlet units theorem.
	Total	**42**	

Text Books:

1. K. Ireland and M. Rosen, A Classical Introduction to Modern Number Theory, 2nd Edition, Springer, 1998.

2. S. Lang, Algebraic Number Theory, 2nd Edition, Springer, 2000.

Reference Books:

1. D. A. Marcus, Number Fields, Springer, 2018.

2. J. Neukirch, Algebraic Number Theory, Springer-Verlag, 1999.