Course Type	Course Code	Name of the Course	L	T	P	Credits
DE	**NMCD523**	Basic Number Theory	3	0	0	3

Course Objective

- Students will be able to (i) effectively express the concepts and results of Number Theory (ii) construct mathematical proofs of statements and find counterexamples to false statements in Number Theory (iii) solve certain systems of Diophantine equations.

Learning Outcomes

- Students will be able to (i) effectively express the concepts and results of Number Theory (ii) construct mathematical proofs of statements and find counterexamples to false statements in Number Theory (iii) solve certain systems of Diophantine equations.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	Prime number, Infinitude of primes, discussion of the Prime Number Theorem, infinitude of primes in specific arithmetic progressions, Dirichlet's theorem (without proof),.	06	Students will learn the different properties of prime numbers and Arithmetic functions.
	Arithmetic functions, Mobius inversion formula. Structure of units modulo n, Euler's phi function.	06	
2	Congruences, theorems of Fermat and Euler, Wilson's theorem, linear congruences, quadratic residues, law of quadratic reciprocity.	09	Students will learn the techniques of congruences and quadratic residues.
3	Binary quadratics forms, equivalence, reduction, Fermat's two square theorem, Lagrange's four square theorem.	06	This unit will help students to understand quadratic forms and their applications.
4	Continued fractions, rational approximations, Liouville's theorem, discussion of Roth's theorem, transcendental numbers, transcendence of e and π,	08	Students will learn the technique of continued fractions. and the Fermat's method of descent,
5	Diophantine equations: Brahmagupta's equation (Pell's equation), the Fermat's method of descent, discussion of the Mordell equation.	07	With the help of this unit, students will be able to solve different Diophantine equations.
Total		42	

Text Books

1. Niven and H.S. Zuckerman, An Introduction to the Theory of Numbers, 5th Edition, Wiley, 2008.

Reference Books

1. A. Baker, A Concise Introduction to the Theory of Numbers, Cambridge University Press, 1985.

2. W. W. Adams and L.J. Goldstein, Introduction to the Theory of Numbers, 3rd Edition, Wiley Eastern, 1976.