Module Code: MATH-423
Module Title: **Number Theory - II**
Module Rating: 3 Cr. Hours
Pre-Requisite: Number Theory - I

Quadratic Residues
- Composite moduli, Legendre symbol
- Law of quadratic reciprocity
- The Jacobi symbol

Diophantine Equations
- Equations and Fermat's conjecture for $n = 2$, $n = 4$

Algebraic Number Theory
- Polynomials over a field
- Divisibility properties of polynomials
- Gauss's lemma
- The Einstein irreducibility criterion
- Symmetric polynomials
- Extensions of a field
- Algebraic and transcendental numbers
- Bases and finite extensions, properties of finite extensions
- Conjugates and discriminants
- Algebraic integers in a quadratic field, integral bases
- Units and primes in a quadratic field
- Ideals, arithmetic of ideals in an algebraic number field
- The norm of an ideal, prime ideals, units of algebraic number field

Recommended Books

1. W. J. Leveque, *Topics in Number Theory*, Vols. I and II (Addison-Wesley Publishing Co. Publishing Co., 1956)
2. Tom M. Apostol, *Introduction to Analytic Number Theory*, (Springer International, 1998)
3. David M. Burton, *Elementary Number Theory*, 6th edition, (McGraw Hill Company, 2007)
4. A. Andrew, *The Theory of Numbers*, (Jones and Barlett Publishers London, 1995)
5. Harry Pollard, *The Theory of Algebraic Numbers*, (John Wiley and Sons, 1950)