



MANGALORE UNIVERSITY
DEPARTMENT OF MATHEMATICS

MTH 452	Algebra - II	4 Credits (48 hours)
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Course Outcome: Students will have the knowledge and skills to Apply the advanced topics viz., Unique factorization domains, Field theory and Galois Theory in Coding theory and Cryptography, and also in diverse situations in physics, chemistry and engineering etc..

Course Specific Outcome: At the end of the course Students will have the knowledge and skills to explain Demonstrate accurate and efficient use of the following advanced topics in various situations -

- Unique factorization domains,
- Euclidean domains,
- Fields(including finite fields), Algebraically closed fields,
- The fundamental theorem of algebra. Galois Theory.

Unit I - Factoring:

Unique factorization domains, Euclidean domains, Content of polynomials, Primitive polynomials, Gauss lemma, Unique factorization in $\mathbb{R}[x]$, where \mathbb{R} is a U.F.D., Irreducibility test mod p , Eisenstein's criterion, Gauss primes.

(16 Hours)

Unit II - Fields:

Algebraic and transcendental elements, the degree of a field extension, Finding the irreducible polynomial, Ruler and compass constructions, Isomorphism of field extensions, Adjoining roots, Splitting fields, Finite fields, Primitive elements, Algebraically closed fields, The fundamental theorem of algebra.

(20 Hours)

Unit III - Galois Theory:

Automorphisms and Fields, Separable Extensions, Galois Theory, Illustrations of Galois Theory, Cyclotomic Extensions, Insolvability of the Quintic.

(12 Hours)

References

- [1] Michael Artin, *Algebra*, 2nd Ed., Prentice Hall of India, 2013.
- [2] J. B. Fraleigh, *A First Course in Abstract Algebra*, 7th Ed., Addison Wesley, 2003.
- [3] I. N. Herstein, *Topics in Algebra*, 2nd Ed., John Wiley & Sons, 2006.
- [4] Joseph A. Gallian, *Contemporary Abstract Algebra*, 8th Ed., Cengage Learning India, 2013.
- [5] Paul B. Garrett, *Abstract Algebra*, CRC press, 2007.
- [6] Thomas W. Hungerford, *Algebra*, Springer, 2004.
- [7] David S. Dummit and Richard M. Foote, *Abstract Algebra*, 3rd Ed., Wiley, 2004.
- [8] Serge Lang, *Algebra*, 3rd Ed., Springer, 2005.

