

ABSTRACT ALGEBRA -II

Course No: **MM24403CR**

Semester: **MA/M.Sc. 4th Semester**

Continuous Assessment Marks: **20**, Theory Marks: **80**

Total Credits: **04**

Total Marks: **100**

Time Duration: **2½ hrs**

Course Objectives: To expose the students to Galois theory in problem solving context and to apply the group theoretic information to deduce results about fields and polynomials.

Course Outcomes: After the completion of this course, Students' shall make use of advanced understanding of abstract algebraic structures and their applications. Field structures, fundamental theory of Galois theory and their applications in linear algebra and other related disciplines.

UNIT - I

Relation and ordering, partially ordered sets, lattices, properties of lattices, lattices as algebraic systems, sub-lattices, direct product and homomorphism, modular lattices, complete lattices, bounds of lattices, distributive Lattice, complemented lattices.

UNIT - II

Modules, sub-modules, quotient modules, homomorphism and isomorphism theorem, cyclic modules, simple modules, semi-simple modules, Schuer's lemma, free modules, ascending chain condition and maximum condition, and their equivalence, descending chain condition and minimum condition and their equivalence, direct sums of modules, finitely generated modules.

UNIT - III

Fields: Prime fields and their structure, extensions of fields, algebraic numbers and algebraic extensions of a field, roots of polynomials, remainder and factor theorems, splitting field of a polynomial, existence and uniqueness of splitting fields of polynomials, simple extension of a field.

UNIT - IV

Separable and in-separable extensions, the primitive element theorem, finite fields, perfect fields, the elements of Galois theory, automorphisms of fields, normal extensions, fundamental theorem of Galois theory, construction with straight edge and compass, \mathbb{R}^n is a field iff $n = 1, 2$.

Recommended Books

1. J. A. Gallian, Contemporary Abstract Algebra, Cengage Learning, USA, 9th Edition, 2015
2. I. N. Herstein, Topics in Algebra, John Wiley & Sons, 2nd Edition, 1975.
3. P. B. Bhattacharaya and S.K.Jain, Basic Abstract Algebra, Cambridge University Press, 4th Edition, Reprint 2009.
4. J. B. Fraleigh, A First Course in Abstract Algebra, Pearson New International, 2014.
5. K. S. Miller, Elements of Modern Abstract Algebra, Krieger Publishing, 1975.
6. Surjeet Singh and Qazi Zameer-ud-Din, Modern Algebra, Vikas Pub Hou. Pvt Ltd, 8th Edition, 2006