20MSM508T					Modern Algebra					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs. / Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	--	--	100

COURSE OBJECTIVES

- To enable student to give a good mathematical maturity and to build mathematical thinking and skill.
- To learn the general algebraic structure of various sets (such as real numbers, complex numbers, matrices, and vector spaces), rather than rules and procedures for manipulating their individual elements.
- To develop the skill of constructing proofs and writing in mathematics.
- To identify the applications of modern algebra in various fields of sciences.

UNIT 1 GROUPS **12 Hrs.**

Introduction to groups, Finite groups, Subgroups, Cyclic groups, Permutation groups, Isomorphism, External direct product, Internal direct product, Cosets and Lagrange's theorem, Normal subgroups, Group homomorphism, Fundamental theorem of finite Abelian groups.

UNIT 2 RINGS **10 Hrs.**

Introduction to Rings, Properties of rings, Integral domains, Ideals and factor rings, Ring homomorphism, Polynomial rings, Factorization of polynomials, Divisibility in integral domains.

UNIT 3 FIELDS **08 Hrs.**

Vector spaces, Extension fields, Algebraic extensions, Finite fields, Geometric constructions.

UNIT 4 SPECIAL TOPICS **10 Hrs.**

Sylow theorems, Finite simple groups, Generators and relations, Symmetry groups, Cayley diagraphs of groups, Introduction to algebraic coding theory, Introduction to Galois theory, Introduction to Boolean Algebra.

40 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Define algebraic structures and to construct substructures.

CO2 – Assess properties implied by the definitions of groups and rings.

CO3 – Apply the theories in abstract algebra in communication theory, electrical engineering, computer science, and cryptography.

CO4 – Analyze and demonstrate examples of subgroups, normal subgroups and quotient groups, Ideals and quotient rings, isomorphism and homomorphism for groups and rings.

CO5 – Appraise the theoretical concepts studied in this subject in the more applied subjects in higher education.

CO6 – Develop new structures based on given structures and compare structures.

TEXT/REFERENCE BOOKS

1. J. A. Gallian, Contemporary Abstract Algebra, 8th ed., Cengage Learning, 2013.
2. A. R. Vasishtha, A. K. Vasishtha, Modern Algebra, Krishna Prakashan Media (P) Ltd., 2002.
3. M. Artin, Algebra, 2nd ed., Pearson, 2010.
4. D. S. Dummit, R. M. Foote, Abstract Algebra, 3rd ed., John Wiley & Sons, 2003.
5. I. N. Herstein, Topics in Algebra, 2nd ed., John Wiley and Sons, 1975 .
6. Lang, Serge, Algebra, Graduate Texts in Mathematics, Revised 3rd ed., New York: Springer-Verlag, 2011.