1.4   Algebra

(w.e.f. academic year 2020-21)

DSC-1D   **BS:401**

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and
Tutorials: 1 hours /week

Objective: The course is aimed at exposing the students to learn some basic algebraic structures like groups, rings etc.

Outcome: On successful completion of the course students will be able to recognize algebraic structures that arise in matrix algebra, linear algebra and will be able to apply the skills learnt in understanding various such subjects.

Unit- I

Groups: Definition and Examples of Groups- Elementary Properties of Groups-Finite Groups - Subgroups -Terminology and Notation -Subgroup Tests - Examples of Subgroups.

Cyclic Groups: Properties of Cyclic Groups - Classification of Subgroups Cyclic Groups.

Unit- II

Permutation Groups: Definition and Notation -Cycle Notation-Properties of Permutations -A Check Digit Scheme Based on D_5. Isomorphisms ; Motivation- Definition and Examples -Cayley's Theorem Properties of Isomorphisms -Automorphisms-Cosets and Lagrange's Theorem Properties of Cosets 138 - Lagrange's Theorem and Consequences-An Application of Cosets to Permutation Groups -The Rotation Group of a Cube and a Soccer Ball.

Unit- III

Normal Subgroups and Factor Groups: Normal Subgroups-Factor Groups -Applications of Factor Groups -Group Homomorphisms - Definition and Examples -Properties of Homomorphisms -The First Isomorphism Theorem.

Introduction to Rings: Motivation and Definition -Examples of Rings -Properties of Rings - Subrings.

Integral Domains: Definition and Examples - Fields – Characteristics of a Ring.

Unit- IV

Ideals and Factor Rings: Ideals -Factor Rings -Prime Ideals and Maximal Ideals.

Ring Homomorphisms: Definition and Examples-Properties of Ring- Homomorphisms.

Text:

- Joseph A Gallian, *Contemporary Abstract algebra (9th edition)*

References:

- Bhattacharya, P.B Jain, S.K.; and Nagpaul, S.R,*Basic Abstract Algebra*

- Fraleigh, J.B, *A First Course in Abstract Algebra.*

- Herstein, I.N, *Topics in Algebra*

- Robert B. Ash, *Basic Abstract Algebra*

- I Martin Isaacs, *Finite Group Theory*

- Joseph J Rotman, *Advanced Modern Algebra*