

ABSTRACT ALGEBRA

Credits:
Subject Code: DS18201

Semester: II
No. of Lecture Hours:75

Objective: To impart basic concepts of algebra and its applications.

Outcomes: Students will be able to

CO1: Demonstrate important mathematical concepts in abstract algebra such as definition of a group, order of a finite group and order of an element.

CO2: Analyze different types of subgroups such as normal subgroups, cyclic subgroups and understand the structure and characteristics of these subgroups

CO3: Solve the algebraic problems using appropriate techniques.

CO4: Analyze the knowledge and understanding of fundamental concepts including groups, subgroups, normal subgroups, homomorphism and isomorphism.

CO5: Demonstrate knowledge and understanding of rings, fields and their properties.

UNIT-I

15hrs

Group theory

1. Binary Operations - **Definition** and properties
2. Groups – definition and elementary properties 5
3. Finite groups and group composition tables 5
4. Sub groups, Cosets, Lagrange's theorem and its applications 5

UNIT-II

15hrs

Normal subgroups and Isomorphism of groups

1. Normal subgroups, simple groups 5
2. Homomorphism of groups, isomorphism, definition and elementary properties 5
3. How to show that groups are isomorphic, fundamental theorem of homomorphism 5

UNIT-III

15hrs

Permutations

1. Functions and permutations, Examples 2
2. Groups of permutations, cycles and cyclic notation 2
3. Even and odd permutations, The alternating groups 2
4. Cyclic groups – Elementary properties 3
5. The classification of cyclic groups, sub groups of finite cyclic groups 3
6. Cayley's theorem, inner automorphism 3

UNIT- IV

15hrs

System Linear Equations of equations:

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| 1. Rank of a Martix Rank-Echelon form | 5 |
| 2. Normal form – Solution of Linear Systems | 5 |
| 3. Homogeneous and non-Homogeneous Equations. | 5 |

UNIT- V

15hrs

Eigen values - Eigen vectors

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| 1. Eigenvalues-Eigenvectors–Properties–Cayley-Hamilton Theorem | 5 |
| 2. Inverse and powers of a matrix by using Cayley-Hamilton theorem | 5 |
| 3. Quadratic forms- Reduction of quadratic form to canonical form | 5 |