SEMESTER-III

COURSE 2: GROUP THEORY

Theory Credits: 4 5 hrs/week

Course Outcomes

After successful completion of this course, the student will be able to

- 1. acquire the basic knowledge and structure of groups
- 2. get the significance of the notation of a subgroup and cosets.
- 3. understand the concept of normal subgroups and properties of normal subgroup
- 4. study the homomorphisms and isomorphisms with applications.
- 5. understand the properties of permutation and cyclic groups

Course Content

Unit – 1

Groups

Binary Operation – Algebraic structure – semi group-monoid – Group definition and elementary properties Finite and Infinite groups – examples – order of a group, Composition tables with examples.

Unit - 2

Sub Groups

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definitionexamples-criterion for a complex to be a subgroups; Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups. Coset Definition – properties of Cosets – Index of a subgroups of a finite groups – Lagrange's Theorem.

Unit – 3

Normal Subgroups

Normal Subgroups: Definition of normal subgroup – proper and improper normal subgroup–Hamilton group- Criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups Sub group of index 2 is a normal sub group

Unit – 4

Homomorphisms

Quotient groups, Definition of homomorphism – Image of homomorphism elementary properties of homomorphism – Isomorphism – automorphism definitions and elementary properties–kernel of a homomorphism – fundamental theorem on Homomorphism and applications.

Unit – 5

Permutations and Cyclic Groups

Cyclic Groups - Definition of cyclic group – elementary properties – classification of cyclic groups.

Activities

Seminar/ Quiz/ Assignments/ Applications of Group Theory to Real life Problem /Problem Solving Sessions.

Text Book

Modern Algebra by A.R.Vasishtha and A.K.Vasishtha, KrishnaPrakashanMedia Pvt. Ltd., Meerut. **Reference Books**

- 1. Abstract Algebra by J.B. Fraleigh, Published by Narosa publishing house.
- 2. Modern Algebra by M.L. Khanna, Jai Prakash and Co. Printing Press, Meerut
- 3. Rings and Linear Algebra by Pundir&Pundir, published by PragathiPrakashan
