SRI VENKATESWARA UNIVERSITY - TIRUPATI
B.S.c., (Honours) in <u>MATHEMATICS</u> (MINOR)
III SEMESTER
(W.E.F. Academic Year 2024 - 25)
<u>COURSE 5: GROUP THEORY&PROBLEM SOLVING SESSIONS</u>

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

<u>Unit – 1 Groups:</u>

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.

<u>Unit – 2 Sub Groups</u>

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition- examples-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.

<u>Unit – 3 Normal Subgroups</u>

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

Definition of permutation – permutation multiplication – Inverse of a permutation – cyclic permutations – transposition – even and odd permutations – Cayley's theorem.
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, Krishna Prakashan Media 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

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