

**ANNEXURE – III**  
**KVR GOVT. COLLEGE FOR WOMEN (AUTONOMOUS), KURNOOL**  
**Re-Accredited by NAAC with Grade "A"**  
**CHOICE BASED CREDIT SYSTEM (w.e.f. 2016-17)**  
**SECOND YEAR B.Sc. MATHEMATICS**  
**SEMESTER-III**  
**CORE COURSE-III: ABSTRACT ALGEBRA (w. e. f. 2021-2022)**

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**UNIT – I (12 Hours):GROUPS :**

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

**UNIT – II (12 Hours):SUBGROUPS :**

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition- examples-criterion for a complex to be a subgroup. Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

**Co-sets and Lagrange's Theorem :**

Cosets Definition – properties of Cosets–Index of a subgroup of a finite group–Lagrange's Theorem.

**UNIT –III (12 Hours):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 – Subgroup of index 2 is a normal subgroup –quotient group – criteria for the existence of a quotient group.

**HOMOMORPHISM :**

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 – IV (12 Hours) PERMUTATION 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.

**UNIT – V (12 Hours):RINGS :**

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring - The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings.

### **Co-Curricular Activities(15 Hours)**

Seminar/ Quiz/ Assignments/ Group theory and its applications / Problem Solving.

### **Text Book :**

A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others,  
published by S.Chand& Company, New Delhi.

### **Reference Books :**

1. Abstract Algebra by J.B. Fraleigh, Published by Narosa publishing house.
2. Modern Algebra by M.L. Khanna.
3. Rings and Linear Algebra by Pundir&Pundir, published by PragathiPrakashan.