ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) , VISAKHAPATNAM

III SEMESTER **MATHEMATICS**

ABSTRACT ALGEBRA **5 Hrs/Week**

M 3301(4) **(Number Theory & Group Theory)** **Max. Marks : 100**

w.e.f 2017-2018 **SYLLABUS**

OBJECTIVES: To enable the students to –

- Learn the definitions and methods.
- Understand the problems, theorems & identities.
- Apply the principles in Engineering, Physics and other Allied Sciences.
- Understand any Science subject.
- Analyze the group theory as a part of Modern algebra.
- Apply the theories in Chemistry.

COURSE

NUMBER THEORY

UNIT I :

a) Divisibility and primes: the Euclid's Division Algorithm–Divisor–Even and Odd integers–Greatest Common Divisor (G.C.D), Construction of G.C.D from Division Algorithm – Relatively Prime or Co prime Integers – Least Common Multiple (L.C.M), PRIMES AND Composite Numbers–Euclid's Lemma–The Fundamental theorem of arithmetic – Canonicals from – The number of divisors of a positive integer n, - The sum of all the distinct positive integral divisors of a positive integer n, - Perfect number – Bracket function.

b) Congruences and the Function: Congruences–Linear Congruences–Euler-ϕ Function – Fermat's theorem – Wilson's theorem.

GROUP THEORY

UNIT – II :

(a) 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.

(b) SUBGROUPS

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.

UNIT –III :

(a) CO-SETS AND LAGRANGE'S THEOREM

Cosets Definition – Properties of Cosets–Index of a Subgroups of a Finite Groups– Lagrange's Theorem.

(b) NORMAL SUBGROUPS

Definition of Normal Nubgroup – 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 – Simple Group – Quotient Group – Criteria for the Existence of a Quotient Group.

UNIT – IV : 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 – V :

(a) PERMUTATIONS AND CYCLIC GROUPS

Definition of Permutation – Permutation Multiplication – Inverse of a Permutation – Cyclic Permutations – Transposition – Even and Odd Permutations – Cayley's Theorem.

(b) CYCLIC GROUPS

Definition of Cyclic Group – Elementary Properties – Classification of Cyclic Groups.

Prescribed Text Book : A Text of Mathematics B.Sc. Mathematics Vol – II by S. CHAND Publications(2016)

Reference Books :

1. Abstract Algebra, by J.B. Fraleigh, Published by Narosa Publishing house. (2006)
2. 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. (2003)
3. Modern Algebra by M.L. Khanna.(1998)
4. Theory of Numbers – Prakash Om (1982) – Lakshmi Publications
5. Introduction to Analytic Number Theory – Tom M. Apostol – Narosa Publishing House, New Delhi. (2001)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) , VISAKHAPATNAM

III SEMESTER **MATHEMATICS**

ABSTRACT ALGEBRA **1 Hr/Week**

M 3351(1) **(Number Theory & Group Theory)** **Max. Marks : 50**

w.e.f 2017-2018

PRACTICAL SYLLABUS

OBJECTIVES: To enable the students to –

- Learn the definitions and methods.
- Understand the problems, theorems & identities.
- Apply the principles in Engineering, Physics and other Allied Sciences.
- Understand any Science subject.
- Analyze the group theory as a part of Modern algebra.
- Apply the theories in Chemistry.

COURSE

NUMBER THEORY

UNIT I :

b) Divisibility and primes: the Euclid's Division Algorithm–Divisor–Even and Odd integers–Greatest Common Divisor (G.C.D), Construction of G.C.D from Division Algorithm – Relatively Prime or Co prime Integers – Least Common Multiple (L.C.M), PRIMES AND Composite Numbers–Euclid's Lemma–The Fundamental theorem of arithmetic – Canonicals from – The number of divisors of a positive integer n, - The sum of all the distinct positive integral divisors of a positive integer n, - Perfect number – Bracket function.

b) Congruences and the Function: Congruences–Linear Congruences–Euler-ϕ Function – Fermat's theorem – Wilson's theorem.

GROUP THEORY

UNIT – II :

(a) GROUPS

(b) SUBGROUPS

UNIT –III :

(a) CO-SETS AND LAGRANGE'S THEOREM

(b) NORMAL SUBGROUPS

UNIT – IV :

HOMOMORPHISMS

UNIT – V :

(a) PERMUTATIONS AND CYCLIC GROUPS

(b) CYCLIC GROUPS

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