ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM VII SEMESTER MATHEMATICS TIME: 4Hrs/Week M 7301(3) ALGEBRA Max.Marks:100 w.e.f .20AH Batch SYLLABUS

Course Objectives:

To enable the students to

- > To introduce the basic concepts of group theory and study the structure of groups.
- > To introduce the concepts of conjugacy and G sets and prove cayley theorem. To introduce explicitly the properties of permutation groups
- > To determine structure of any abelian groups. To determine structure of finite nonabelian groups through Sylow theorems.
- > To introduce concepts of ring theory. To introduce different types of ideals. To apply Zorn's lemma on the set of ideals.
- > To introduce prime elements and irreducible elements in a commutative integral domain. To study the domains UFD, PID and ED

Course Outcomes

After successful completion of the course, students will be able to

- > understand the direct product of groups and application of Sylow's theorems
- understand the homomorphic relation between the groups, sum and direct sum of ideals
- know factorizing the domains, factorization of polynomials and describe some other forms of polynomial rings
- > know about submodules and direct sums
- ➤ know about Free modules and Representation of linear mappings

UNIT-I

Structure theorems of groups

15 HrsDirect products-Finitely generated abelian groups-Invariants of a finite abelian group-Sylow theorems. (Sections 8.1 to 8.4 of the Chapter 8 in the Prescribed Text Book.)

UNIT-II

Ideals and Homomorphisms

15 Hrs Ideals-Homomorphisms-Sums and direct sums of ideals- Maximal and prime ideals-Nilpotentand nil ideals-Zorn's lemma. (Sections 10.1 to10.6 of the Chapter 10 in the Prescribed Text Book.)

UNIT-III

Unique factorization domains and Euclidean domains

15 HrsUnique factorization domains-Principal ideal domains-Euclidean domains-Polynomial rings over UFD (Sections 11.1 to 11.4 of the Chapter 11 in the Prescribed Text Book.)

UNIT IV Modules and Vector Spaces

15 HrsDefinition and examples – Submodules and direct sums – R-homomorphisms and quotient modules (Sections 1,2 & 3 of Chapter - 14)

UNIT V Free Modules

15 Hrs

Completely reducible modules – Free modules – Representation of linear mappings – Rankof linear mapping (Sections 4 to 7 of Chapter - 14)

Activities:

- 1. Assignments
- 2. Student Seminars and Guest Lecturers
- 3. Problem Solving Sessions

Text Book:

Basic Abstract Algebra by P.B.Battacharya, S.K.jain, S.R.Nagpaul, Cambridge UniversityPress,1995.

Reference Books:

- 1. Topics in Algebra: I. N. Herstein, 2nd Edition, John Wiley & Sons
- 2. Algebra: Thomas W. Hungerford, Springer
- 3. Algebra: Serge Lang, Revised Third Edition, Springer