MTH6012: Algebra

Programme: M.Sc. Year: IST Semester: Even
Course: Credits: 4 Hours: 40

Course Context and Overview (100 words):

Student will learn the basic concepts of Abstract Algebra which are used in many engineering discipline.

Prerequisites Courses: No

Course outcomes (COs):

On completion of this course, the students will have the ability to:
CO1: Demonstrate factual knowledge including the mathematical notation and terminology used in this course.
C02: Describe the fundamental principles including the laws and theorems arising from the concepts covered in this course.
C03: Apply course material along with techniques and procedures covered in this course to solve problems.
C04: Develop specific skills, competencies and thought processes sufficient to support further study or work in this or related fields.

Course Topics:

Topics	Lecture Hours	
UNIT - I **Groups :** Binary operation and its properties, Definition of a group, Examples and basic properties. Subgroups, Cyclic groups, Dihedral Groups, Permutation, Cayley's theorems. Coset of a subgroup, Equivalence classes, Lagrange's theorem, Order of a group, Normal subgroups, Quotient group, Center of Group, Cauchy's Theorems, Normalizer. Solvable group.		15
UNIT – II **Homeomorphism and Sylow's Theorems :** Homeomorphisms, Kernel Image of a homomorphism, Isomorphism theorems, Direct product of groups, Sylow' theorems and applications.		5

UNIT - III **Rings:** Definition, Examples and basic properties. Zero divisors, Integral domains. Characteristic of a ring, Quotient field of an integral domain. Subrings, Ideals, Quotient rings, Ring of polynomials. Irreducibility of Polynomials, UFD, Euclidean Ring, Prime ideal, Maximal ideals.		12
UNIT – IV **Field:** Basic of Field, Field Extension, Splitting Field, Finite Field, Galois Theory.		8

Textbooks (IEEE format):

1. J. Gallian, Contemporary Abstract Algebra, 4th edition, Narosa, 2009.

References Books

1. **E. Artin,** Algebra, Prentice-Hall of India.
2. **I.N. Herstein**, Topics in Algebra, Wiley, 2008.
4 **J. B. Fraleigh**, A First Course in Abstract Algebra, Pearson, 2003.

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.):

Evaluation Methods:

Item	Weightage
Attendance	20 %
Two Quizzes	
Midterm	30 %
ESE	50 %

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