Course Type	Course Code	Name of Course	L	Т	Р	Credit
DC1	MCC201	Modern Algebra	3	0	0	9

Course Objective

Modern Algebra plays an important role in the Computer science and Electrical Communications as well as in mathematics itself. Consequently, it becomes more and more desirable to introduce the student to the group theory and ring theory at an early stage of study.

Learning Outcomes

Algebra is an abstract branch of mathematics that originated from set theory. The main outcome of this course is to develop the capacity for mathematical reasoning through analyzing, proving and explaining concepts from groups and rings.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Binary operation, and its properties, Definition of a group, Examples and basic properties.	4	Understanding of basic properties of group theory.
2	Subgroups, Coset of a subgroup, Lagrange's theorem.	4	Study of subgroups and their properties.
3	Cyclic groups, Order of a group. Normal subgroups, Quotient group	4	Study of cyclic groups.
4	Homomorphisms, Kernel Image of a homomorphism, Isomorphism theorems.	4	Discussion on relation between structures of any two groups.
5	Permutation groups, Cayley's theorems. Direct product of groups	4	Study of properties of symmetric groups.
6	Group action on a set, Semi-direct product. Sylow's theorems. Structure of finite abelian groups.	4	Study of Sylow's theorem.

7	Definition, Examples and basic properties. Zero divisors, Integral domains.	4	Discussion on zero divisors and their properties
8	Fields, Characteristic of a ring, Quotient field of an integral domain. Subrings, Ideals, Quotient rings.	4	Study of fields and Ideals of rings.
9	Isomorphism theorems. Ring of polynomlals. Prime, Irreducible elements and their properties.	4	Study of isomorphism theorems on rings.
10	UFD, PID and Euclidean domains. Prime ideal, Maximal ideals.	3	Discussion on factorizations of polynomials and their different Ideal structures.
11	Field Extension, Splitting fields and Finite fields	3	Discussion on construction of fields.

Text Books

1. D.S. Dummit and R. M. Foote, Abstract Algebra, 2nd Edition, John Wiley, 2002.

Reference Books

- 1. M. Artin, Algebra, Prentice Hall of India, 1994.
- 2. J.A. Gallian, Contemporary Abstract Algebra, 4th Edition, Narosa, 1999.