Course Code	MTH302
Course Name	Algebra
Credits	4
Course Offered to	UG+PG
Course Description	Algebraic structures are of fundamental importance in mathematics and play an increasingly significant role in many application areas, including computer science and communication. This course introduces the main algebraic structures: groups, rings and fields. Fundamental concepts and properties of these structures are studied, both in the abstract and in relation to concrete families of structures. Furthermore, algebra is an excellent vehicle for training students in mathematical rigour, proofs, and problem solving.

Pre-requisites

Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requisite(other)
	MTH 100 or equivalent (Linear Algebra)	

*Please insert more rows if required

Post Conditions*(For suggestions on verbs please refer the second sheet)

CO1	CO2	CO3	CO4	CO5
To explain algebraic properties of some ir	To be able to classify groups up to isomorphism	To discuss algebraic properties of rings and fields (particularly finite fields), and to be able to classify rings and fields up to isomorphism	To be able to write down formal mathematical proofs	To be able to apply these concepts to model and solve problems in communication and computer science

Weekly Lecture Plan

Week Number	Lecture Topic	COs Met	Assignment/Labs/Tutorial
1	Equivalence relation and partition. Groups and subgroups, Cyclic groups, Abelian groups, Matrix groups, Quaternionic group.	CO1&4	Tutorial Sheet 1
2	Lagrange's theorem, normal subgroup, quotient groups, isomorphisr	CO1,2 & 4	Tutorial Sheet 2
3	Permutation groups, Simple groups, Simplicity of the alternating group.	CO1,2&4	Tutorial Sheet 3
4	Centralizers and Normalizers, the class equation and its applications.Dihedral Groups.	CO1,2 & 4	Tutorial Sheet 4
5	Sylow's theorems and their applications.	CO1,2 & 4	Tutorial Sheet 5
6	Direct product of groups, Fundamental Theorem of Finite Abelian groups	CO1,2 & 4	Tutorial Sheet 6
7	p-groups, Nilpotent groups, Solvable groups, Jordon-Holder Theorem	CO1,2 & 4	Tutorial Sheet 7
8-9	Rings, Matrix rings and Group rings, units and zero divisors, ideals, quotient rings, principal ideal, prime ideal, maximal ideal, nil and nilpotent ideals, integral domain.	CO3 & 4	Tutorial Sheet 8
10	Isomorphism of rings, Direct product of rings, Polynomial rings, The	CO3 & 4	Tutorial Sheet 9
11-12	Principal ideal domain, Euclidean domain, Unique factorization Domain	CO3 & 4	Tutorial Sheet 10
13	Fields, Finite fields, field extensions, Algebraic extenions, splitting fie	CO3, 4 & 5	Tutorial Sheet 11

*Please insert more rows if required

Weekly Lab Plan

Week Number	Laboratory Exercise	COs Met	Platform (Hardware/Software)

*Please insert more rows if required

Assessment Plan

Type of Evaluation	% Contribution in Grade
Quizzes	30 %
Minor	0.3
Major	40 %

*Please insert more row for other type of Evaluation

Resource Material

Type	Title
Textbook	1. I N Herstein, Topics in Algebra, 2nd Edition, Wiley India Pvt Ltd, 2006.
	2. J A Gallian, Contemporary Abstract Algebra, 4th Edition, Narosa Book Distributors Private
	Ltd, 2004.
	3. M Artin, Algebra, 2nd Edition, Pearson, 2010
	4. D. S. Dummit and R. M. Foote, Abstract Algebra, 3rd edition, Wiley (2003).