Course Code	MTH513
Course Name	Abstract Algebra II
Credits	4
Course Offered to	UG/PG
Course Description	This course discusses factorization theory in integral domains, and basic properties of solvable groups, nilpotent groups and rings with chain conditions. This course also introduces Galois Theory, which was initiated by Galois in the 19th century. As applications of Galois Theory, solvability of polynomials by radicals, and classical straightedge (ruler) and compass constructions will be discussed.

Pre-requisites		
Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requisite(other)
Math I (MTH100), Abstract Algebra I (MTH212)		

*Please insert more rows if required

Post Conditions*(For suggestions on verbs please refer the second sheet)				
CO1	**CO2**	**CO3**	**CO4**	**CO5**
To be able to explain factorization theory in integral domains, basic properties of solvable groups, nilpotent groups, rings with chain conditions, and several field extensions.	To be able to solve mathematical problems applying the results presented in the course.	To be able to explain insolvabilty of polynomials of degree greater than or equal to 5 by radicals applying Galois Theory.	To be able to explain impossibility of certain geometric constructions applying Galois Theory	To be able to produce examples and counterexamples illustrating the mathematical concepts presented in the course.

Weekly Lecture Plan

Week Number	**Lecture Topic**	**COs Met**	**Assignment/Labs/Tutorial**
One	Solvable groups, Nilpotent groups, Jordan-Holder Theorem	CO1, CO2 and CO5	Tutorial Sheet
Two-Four	Factorization Theory in Integral domains: Prime and irreducible elements, Principal ideal domains, Euclidean domains, Unique factorization domains, Eisenstein's Irreducibility Criterion.	CO1, CO2 and CO5	Tutorial Sheet
Five	Rings with Chain conditions: Noetherian rings, Artinian rings	CO1, CO2 and CO5	Tutorial Sheet
Six-Eight	Fields: Prime fields, Extension of fields, Algebraic extensions, Separable and Inseparable extensions, Cyclotomic polynomials and extensions.	CO1, CO2 and CO5	Tutorial Sheet
Nine-Eleven	Galois Theory: Galois fields and their structure, The Galois group of a polynomial, Normal extensions and Fundamental Theorem of Galois Theory	CO1, CO2 and CO5	Tutorial Sheet
Twelve-Thirteen	Radical extensions and solvability of polynomials by radicals, applications to the classical straightedge and compass constructions.	CO2, CO3, CO4 and CO5	Tutorial Sheet

*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
Quiz	20
Mid-sem	30
End-sem	50

*Please insert more row for other type of Evaluation

Resource Material

Type	**Title**
Textbook	1. P. J. McCarthy, Algebraic extensions of Fields, Dover publications.
	2. Thomas W. Judson,Abstract Algebra: Theory and Applications, Orthogonal publishing I3c.
	3. G. Bini and F. Flamini, Finite commutative rings and their applications, Springer
	4. D. S. Dummit and R. M. Foote, Abstract Algebra, 3rd edition, Wiley (2003).
	5. Nathan Jaconson, Basic Algebra, vol. 1 HPC.
	6. Michael Artin, Algebra, PHI.
	7. J. Rotman, Galois Theory, Springer.
	8. B.R. McDonald, Finite Rings with Identity, Dekker, New York (1974)