

**INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI**  
**PROFORMA FOR NEW COURSE**

1.	Title of the Course	Algebra
2.	Course Number	MA5206
3.	Status of the Course	Core
4.	Structure of Credits	3-0-0-3
5.	Offered To	PG
6.	New Course/Modification to	New
7.	To be Offered by	Department of Mathematics
8.	To take effect from	July 2019
9.	Prerequisite	Nil
10.	Whether approved by the Department	Yes
11.	<b>Course Objective:</b> To introduce the notions of Groups, Rings and Fields. Using these notions to study the structure theorem of finite Abelian groups, Chinese remainder theorem, Field extensions and Galois theory.	
12.	<b>Course Content:</b> Group Theory: Review of basic Group Theory, Normal Subgroups, Quotient Groups and Homomorphism Theorems, Group Actions with examples, Cayley's Theorem, The Class Equation and their application, Sylow's Theorems, Direct Products, Structure Theorem for Finite Abelian Groups, Existence and universal Properties of free Groups. Commutative Ring With Identity: Review of basic Ring Theory, Properties of Ideals, Prime and Maximal Ideals, Zorn's lemma and existence of maximal ideals, Quotient Rings and Localization, Chinese Remainder Theorem, Field of Fractions and Integral Domains, Euclidean Domain, Principal Ideal Domain(PID), Unique Factorization Domain(UFD), Irreducibility Criterion, Primes in $\mathbb{Z}[i]$ and Fermat's Two-Square Theorem, Definition and simple examples of modules over commutative and non-commutative rings. Field Theory: Finite and Algebraic Extensions, Existence and Cardinality of Algebraic Closure, Finite Fields, Galois Theory of Polynomial in characteristic zero and simple examples.	
13.	Text book(s): 1. D. S. Dummit, R. M. Foote, <i>Abstract Algebra</i> , Wiley, (2003). 2. J.A. Gallian, <i>Contemporary Abstract Algebra</i> , Brooks/Cole, (2016).	
14.	Reference(s): 1. S. Lang, <i>Algebra</i> , Springer-Verlag, (2005). 2. M. Artin, <i>Algebra</i> , Pearson, (2010). 3. I.N. Herstein, <i>Topics in Algebra</i> , Wiley, (2006). 4. T. A. Hungerford, <i>Algebra</i> , Springer, (2003).	