

## NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Mathematics - NOC:Galois Theory

Subject Co-ordinator - Prof. Dilip P. Patil

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Historical Perspectives  
Lecture 2 - Examples of Fields  
Lecture 3 - Polynomials and Basic properties  
Lecture 4 - Polynomial Rings  
Lecture 5 - Unit and Unit Groups  
Lecture 6 - Division with remainder and prime factorization  
Lecture 7 - Zeroes of Polynomials  
Lecture 8 - Polynomial functions  
Lecture 9 - Algebraically closed Fields and statement of FTA  
Lecture 10 - Gauss's Theorem (Uniqueness of factorization)  
Lecture 11 - Digression on Rings homomorphism, Algebras  
Lecture 12 - Kernel of homomorphisms and ideals in  $K[X], \mathbb{Z}$   
Lecture 13 - Algebraic elements  
Lecture 14 - Examples  
Lecture 15 - Minimal Polynomials  
Lecture 16 - Characterization of Algebraic elements  
Lecture 17 - Theorem of Kronecker  
Lecture 18 - Examples  
Lecture 19 - Digression on Groups  
Lecture 20 - Some examples and Characteristic of a Ring  
Lecture 21 - Finite subGroups of the Unit Group of a Field  
Lecture 22 - Construction of Finite Fields  
Lecture 23 - Digression on Group action - I  
Lecture 24 - Automorphism Groups of a Field Extension  
Lecture 25 - Dedekind-Artin Theorem  
Lecture 26 - Galois Extension  
Lecture 27 - Examples of Galois extension  
Lecture 28 - Examples of Automorphism Groups  
Lecture 29 - Digression on Linear Algebra

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- Lecture 30 - Minimal and Characteristic Polynomials, Norms, Trace of elements
- Lecture 31 - Primitive Element Theorem for Galois Extension
- Lecture 32 - Fundamental Theorem of Galois Theory
- Lecture 33 - Fundamental Theorem of Galois Theory (Continued...)
- Lecture 34 - Cyclotomic extensions
- Lecture 35 - Cyclotomic Polynomials
- Lecture 36 - Irreducibility of Cyclotomic Polynomials over  $\mathbb{Q}$
- Lecture 37 - Reducibility of Cyclotomic Polynomials over Finite Fields
- Lecture 38 - Galois Group of Cyclotomic Polynomials
- Lecture 39 - Extension over a fixed Field of a finite subGroup is Galois Extension
- Lecture 40 - Digression on Group action - II
- Lecture 41 - Correspondence of Normal SubGroups and Galois sub-extensions
- Lecture 42 - Correspondence of Normal SubGroups and Galois sub-extensions (Continued...)
- Lecture 43 - Inverse Galois problem for Abelian Groups
- Lecture 44 - Elementary Symmetric Polynomials
- Lecture 45 - Fundamental Theorem on Symmetric Polynomials
- Lecture 46 -  $\text{Gal}(K[X_1, X_2, \dots, X_n]/K[S_1, S_2, \dots, S_n])$
- Lecture 47 - Digression on Symmetric and Alternating Group
- Lecture 48 - Discriminant of a Polynomial
- Lecture 49 - Zeroes and Embeddings
- Lecture 50 - Normal Extensions
- Lecture 51 - Existence of Algebraic Closure
- Lecture 52 - Uniqueness of Algebraic Closure
- Lecture 53 - Proof of The Fundamental Theorem of Algebra
- Lecture 54 - Galois Group of a Polynomial
- Lecture 55 - Perfect Fields
- Lecture 56 - Embeddings
- Lecture 57 - Characterization of finite Separable extension
- Lecture 58 - Primitive Element Theorem
- Lecture 59 - Equivalence of Galois extensions and Normal-Separable extensions
- Lecture 60 - Operation of Galois Group of Polynomial on the set of zeroes
- Lecture 61 - Discriminants
- Lecture 62 - Examples for further study