

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

NPTEL Video Course - Mathematics - NOC:Mathematical Methods in Physics 2

Subject Co-ordinator - Prof. Auditya Sharma

Co-ordinating Institute - IISER - Bhopal

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

Lecture 1 - Introduction to complex numbers  
Lecture 2 - The triangle inequality  
Lecture 3 - The de Moivre formula  
Lecture 4 - Roots of unity  
Lecture 5 - Functions of a complex variable and the notion of continuity  
Lecture 6 - Derivative of a complex function  
Lecture 7 - Differentiation rules for a complex function  
Lecture 8 - Cauchy-Riemann Equations  
Lecture 9 - Sufficient conditions for differentiability  
Lecture 10 - Cauchy-Riemann conditions in polar coordinates  
Lecture 11 - More perspective on differentiability  
Lecture 12 - The value of the derivative  
Lecture 13 - Analytic functions  
Lecture 14 - Harmonic functions  
Lecture 15 - The exponential function  
Lecture 16 - Complex logarithm  
Lecture 17 - Complex exponents  
Lecture 18 - Trigonometric functions of complex variables  
Lecture 19 - Hyperbolic functions of complex variables  
Lecture 20 - Inverse Trigonometric and Hyperbolic functions  
Lecture 21 - Branch of a multivalued function  
Lecture 22 - Contour Integrals  
Lecture 23 - Green's Theorem  
Lecture 24 - Path dependence of the contour integral  
Lecture 25 - Antiderivatives  
Lecture 26 - The Cauchy theorem  
Lecture 27 - Crossing contours and multiply connected domains  
Lecture 28 - Cauchy Integral formula  
Lecture 29 - Derivatives of an analytic function

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- Lecture 30 - Liouville's theorem and the Fundamental theorem of algebra
- Lecture 31 - Taylor Series
- Lecture 32 - Laurent Series
- Lecture 33 - Convergence
- Lecture 34 - Differentiation and integration of power series
- Lecture 35 - Isolated Singularities
- Lecture 36 - Residues
- Lecture 37 - Residue Theorem
- Lecture 38 - Evaluation of integrals - I
- Lecture 39 - Evaluation of integrals - II
- Lecture 40 - Analytic Continuation
- Lecture 41 - Introduction of orthogonal polynomials
- Lecture 42 - How to construct orthogonal polynomials
- Lecture 43 - The weight function
- Lecture 44 - Recursion relations
- Lecture 45 - Differential equation satisfied by the orthogonal polynomials
- Lecture 46 - Hermite polynomials
- Lecture 47 - Properties of Hermite polynomials
- Lecture 48 - Legendre polynomials
- Lecture 49 - Legendre polynomials: recurrence relation
- Lecture 50 - Differential equation corresponding to Legendre polynomials
- Lecture 51 - The generating function corresponding to Legendre polynomials
- Lecture 52 - Laguerre Polynomials
- Lecture 53 - Laguerre Polynomials: recurrence relation
- Lecture 54 - Laguerre polynomials: differential equation
- Lecture 55 - Laguerre polynomials: generating function
- Lecture 56 - Bessel functions: series definition
- Lecture 57 - Bessel functions: recurrence relations
- Lecture 58 - Bessel functions: differential equation
- Lecture 59 - Bessel functions of integral order: generating function
- Lecture 60 - Bessel functions: orthogonality
- Lecture 61 - Classification of Second Order PDEs
- Lecture 62 - Canonical Forms for Hyperbolic PDEs
- Lecture 63 - Canonical Forms for Parabolic PDEs
- Lecture 64 - Canonical Forms for Elliptic PDEs
- Lecture 65 - The Laplace Equation
- Lecture 66 - The Laplace Equation: Separation of Variables
- Lecture 67 - The Laplace Equation: Dirichlet and Neumann boundary conditions
- Lecture 68 - The Laplace Equation in Cartesian coordinates

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- Lecture 69 - The Laplace Equation for a 3-D rectangular box
- Lecture 70 - The Laplace Equation in spherical coordinates
- Lecture 71 - The Laplace Equation in Spherical Coordinates: Solution
- Lecture 72 - The Laplace Equation in Spherical Coordinates: illustrative examples
- Lecture 73 - The Poisson's Equation: Green's function solution
- Lecture 74 - The heat equation: a heuristic discussion
- Lecture 75 - From the random walk to the diffusion equation
- Lecture 76 - Solution of the Diffusion equation
- Lecture 77 - The Diffusion equation with Dirichlet and Neumann boundary conditions
- Lecture 78 - The Heat equation: illustrative examples
- Lecture 79 - The Wave equation: Method of characteristics
- Lecture 80 - The Wave equation: Separation of variables