

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

NPTEL Video Course - Mathematics - NOC:Partial Differential Equations

Subject Co-ordinator - Prof. Sivaji Ganesh

Co-ordinating Institute - IIT - Bombay

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

- Lecture 1 - Partial Differential Equations - Basic concepts and Nomenclature
- Lecture 2 - First Order Partial Differential Equations- How they arise? Cauchy Problems, IVPs, IBVPs
- Lecture 3 - First order Partial Differential Equations - Geometry of Quasilinear equations
- Lecture 4 - FOPDE's - General Solutions to Linear and Semilinear equations
- Lecture 5 - First order Partial Differential Equations- Lagrange's method for Quasilinear equations
- Lecture 6 - Relation between Characteristic curves and Integral surfaces for Quasilinear equations
- Lecture 7 - Relation between Characteristic curves and Integral surfaces for Quasilinear equations
- Lecture 8 - FOPDE's - Method of characteristics for Quasilinear equations - 1
- Lecture 9 - First order Partial Differential Equations - Failure of transversality condition
- Lecture 10 - First order Partial Differential Equations - Tutorial of Quasilinear equations
- Lecture 11 - FOPDE's - General nonlinear equations 1 - Search for a characteristic direction
- Lecture 12 - FOPDE's - General nonlinear equations 2 - Characteristic direction and characteristic strip
- Lecture 13 - FOPDE's - General nonlinear equations 3 - Finding an initial strip
- Lecture 14 - FOPDE's - General nonlinear equations 4 - Local existence and uniqueness theorem
- Lecture 15 - First order Partial Differential Equations - Tutorial on General nonlinear equations
- Lecture 16 - First order Partial Differential Equations - Initial value problems for Burgers equation
- Lecture 17 - FOPDE's - Conservation laws with a view towards global solutions to Burgers equation
- Lecture 18 - Second Order Partial Differential Equations - Special Curves associated to a PDE
- Lecture 19 - Second Order Partial Differential Equations - Curves of discontinuity
- Lecture 20 - Second Order Partial Differential Equations - Classification
- Lecture 21 - SOPDE's - Canonical form for an equation of Hyperbolic type
- Lecture 22 - SOPDE's - Canonical form for an equation of Parabolic type
- Lecture 23 - SOPDE's - Canonical form for an equation of Elliptic type
- Lecture 24 - Second Order Partial Differential Equations - Characteristic Surfaces
- Lecture 25 - SOPDE's - Canonical forms for constant coefficient PDEs
- Lecture 26 - Wave Equation - A mathematical model for vibrating strings
- Lecture 27 - Wave Equation in one space dimension - d'Alembert formula
- Lecture 28 - Tutorial on One dimensional wave equation
- Lecture 29 - Wave Equation in d space dimensions - Equivalent Cauchy problems via Spherical means

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- Lecture 30 - Cauchy problem for Wave Equation in 3 space dimensions - Poisson-Kirchhoff formulae
- Lecture 31 - Cauchy problem for Wave Equation in 2 space dimensions - Hadamard's method of descent
- Lecture 32 - Nonhomogeneous Wave Equation - Duhamel principle
- Lecture 33 - Wellposedness of Cauchy problem for Wave Equation
- Lecture 34 - Wave Equation on an interval in? - Solution to an IBVP from first principles
- Lecture 35 - Tutorial on IBVPs for wave equation
- Lecture 36 - IBVP for Wave Equation - Separation of Variables Method
- Lecture 37 - Tutorial on Separation of variables method for wave equation
- Lecture 38 - Qualitative analysis of Wave equation - Parallelogram identity
- Lecture 39 - Qualitative analysis of Wave equation - Domain of dependence, domain of influence
- Lecture 40 - Qualitative analysis of Wave equation - Causality Principle, Finite speed of propagation
- Lecture 41 - Qualitative analysis of Wave equation - Uniqueness by Energy method
- Lecture 42 - Qualitative analysis of Wave equation - Huygens Principle
- Lecture 43 - Qualitative analysis of Wave equation - Generalized solutions to Wave equation
- Lecture 44 - Qualitative analysis of Wave equation - Propagation of waves
- Lecture 45 - Laplace equation - Associated Boundary value problems
- Lecture 46 - Laplace equation - Fundamental solution
- Lecture 47 - Dirichlet BVP for Laplace equation - Green's function and Poisson's formula
- Lecture 48 - Laplace equation - Weak maximum principle and its applications
- Lecture 49 - Laplace equation - Dirichlet BVP on a disk in R^2 for Laplace equations
- Lecture 50 - Tutorial 1 on Laplace equation
- Lecture 51 - Laplace equation - Mean value property
- Lecture 52 - Laplace equation - More qualitative properties
- Lecture 53 - Laplace equation - Strong Maximum Principle and Dirichlet Principle
- Lecture 54 - Tutorial 2 on Laplace equation
- Lecture 55 - Cauchy Problem for Heat Equation - 1
- Lecture 56 - Cauchy Problem for Heat Equation - 2
- Lecture 57 - IBVP for Heat equation Subtitle: Method of Separation of Variables
- Lecture 58 - Maximum principle for heat equation
- Lecture 59 - Tutorial on heat equation
- Lecture 60 - Heat equation Subheading : Infinite speed of propagation, Energy, Backward Problem