

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

NPTEL Video Course - Physics - NOC:Electromagnetism

Subject Co-ordinator - Prof. Nirmal Ganguli

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Vector algebra  
Lecture 2 - Vector algebra in component form  
Lecture 3 - Vector triple products  
Lecture 4 - Vector differential calculus  
Lecture 5 - Divergence  
Lecture 6 - Curl  
Lecture 7 - Tutorial on differential vector calculus  
Lecture 8 - More problems on vector differential calculus  
Lecture 9 - Vector integral calculus  
Lecture 10 - Surface integral  
Lecture 11 - Volume integral  
Lecture 12 - Fundamental theorems of vector calculus  
Lecture 13 - The divergence theorem (Gauss's theorem)  
Lecture 14 - The curl theorem (Stokes' theorem)  
Lecture 15 - Curvilinear coordinates  
Lecture 16 - Generic curvilinear coordinate systems  
Lecture 17 - Differential vector calculus in curvilinear coordinate systems  
Lecture 18 - Special curvilinear coordinate systems  
Lecture 19 - Vector calculus in spherical coordinate system  
Lecture 20 - Vector calculus in cylindrical coordinate system  
Lecture 21 - Introduction to Dirac delta function  
Lecture 22 - Tutorial on vector calculus and curvilinear coordinates  
Lecture 23 - Introduction to electrostatics  
Lecture 24 - Continuous charge distribution  
Lecture 25 - Electric field due to a line charge distribution  
Lecture 26 - Electric field lines, Flux, Gauss law  
Lecture 27 - Application of Gauss law with cylindrical symmetry  
Lecture 28 - Application of Gauss law on a flat 2D surface  
Lecture 29 - Tutorial on Dirac delta function and electrostatics

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- Lecture 30 - Tutorial on electrostatics
- Lecture 31 - The curl of an electric field
- Lecture 32 - Scalar potential
- Lecture 33 - Calculation of electric potential from different approaches
- Lecture 34 - Boundary conditions on electric field and potential
- Lecture 35 - Work and energy of an assembly of point charges
- Lecture 36 - General idea of energy in electrostatics
- Lecture 37 - Electrostatics with conductors
- Lecture 38 - Capacitors
- Lecture 39 - Laplace equation
- Lecture 40 - Boundary conditions and the uniqueness theorems
- Lecture 41 - The method of images
- Lecture 42 - Induced charge
- Lecture 43 - Force and energy
- Lecture 44 - Another example of the method of images
- Lecture 45 - Electric dipoles
- Lecture 46 - Multipole expansion, continuous charge distribution, and assembly of point charges
- Lecture 47 - Electric field due to a dipole
- Lecture 48 - Introduction to electric polarization in matter
- Lecture 49 - Electric polarization and bound charges
- Lecture 50 - Electric displacement vector and Gauss law
- Lecture 51 - Boundary conditions on the displacement vector and linear dielectric materials
- Lecture 52 - Parallel plate capacitors
- Lecture 53 - Energy in dielectric materials
- Lecture 54 - Force on dielectric materials
- Lecture 55 - Motion of a charged particle in electromagnetic field
- Lecture 56 - Work done by a magnetic field
- Lecture 57 - Electric current
- Lecture 58 - Surface and volume current
- Lecture 59 - Biot Savart law
- Lecture 60 - Biot Savart law with surface and volume currents
- Lecture 61 - A tutorial on currents and magnetic field
- Lecture 62 - Straight line current
- Lecture 63 - Divergence and curl of a generic magnetic field
- Lecture 64 - Ampere's law in integral form and its applications
- Lecture 65 - Magnetic field in a long solenoid
- Lecture 66 - A comparison between electrostatics and magnetostatics
- Lecture 67 - Magnetic vector potential
- Lecture 68 - Tutorial on magnetic fields

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- Lecture 69 - Calculation of vector potential
- Lecture 70 - Boundary conditions on magnetic field
- Lecture 71 - Magnetic dipole
- Lecture 72 - Multipole expansion of the vector potential
- Lecture 73 - Magnetism, force and torque on magnetic dipole
- Lecture 74 - Fringing magnetic field
- Lecture 75 - Magnetization
- Lecture 76 - A tutorial on the magnetic dipole moment
- Lecture 77 - Ampere's law in magnetized materials
- Lecture 78 - Electrodynamics
- Lecture 79 - Electromagnetic induction
- Lecture 80 - Laws of electromagnetism so far
- Lecture 81 - Maxwell's correction to electromagnetism
- Lecture 82 - Fictitious discussion about symmetry
- Lecture 83 - Maxwell's equations in matter and the boundary conditions