JML215_(310) Electricity and Magnetism

Electrostatics: Coulomb's law, Electric field, Continuous Charge distributions, Field lines, Gauss' law, Applications, Electric Potential, Poisson's and Laplace's Equations, Boundary Conditions, Work, Energy, Induced Charge, Surface Charge, Capacitors (5)

Calculating Potentials: Laplace's equations in 1, 2 and 3-dimensions, Uniqueness Theorems, Method of Images, Separation of Variables, Multipole Expansion, Electric Field of a dipole (4)

Electrostatic Fields in Matter: Polarization, Dielectrics, Polar Molecules, Bound Charges, Electric Displacement, Linear Dielectrics, Susceptibility, Permittivity, Dielectric Constant (5)

Magnetostatics: Lorentz law, Magnetic fields and currents, Biot-Savart law, Divergence and Curl of B, Ampere's Law, Magnetic Vector potentials (4)

Magnetostatics in Matter: Magnetization, Dia, Para, and Ferromagnets, Torques, Field, Auxiliary Field H, Linear and Non-linear susceptibilities and Permeabilities (3)

Electrodynamics: Ohm's law, Electromotive force, Faraday's law, Maxwell's Equations, Scalar and Vector Potentials, Gauge Transformations, Coulomb and Lorentz Gauge, Newton's Third Law, Poynting's Theorem (5)

Electromagnetic Waves: Wave equation, Propagation through vacuum, linear medium, in conductors, Dispersion, Group velocity (4)

Books:

1. Introduction to Electrodynamics by D.J. Griffiths, Prentice-Hall India
2. Classical Electrodynamics by J.D. Jackson, Wiley