

(As per New Syllabus of NCERT/CBSE)

Revised
Edition

S. Chand's
Principles of
Physics

FOR CLASS XII
With Value Based Questions

Also useful
for Engineering
& Medical
Ent. Exams



V.K. MEHTA
ROHIT MEHTA

As per the New CBSE Course Structure and New NCERT Guidelines.

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Principles of
Physics

For
CLASS XII

[with Value Based Questions]

**[Senior Secondary Certificate Examinations of CBSE,
Other State Boards of School Education and
Various Engineering/Medical Entrance Examinations]**

V.K. MEHTA
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PREFACE TO THE SEVENTH EDITION

The general response to the sixth edition of the book was very encouraging. The authors feel that their work has been amply rewarded and wish to express their deep sense of gratitude to the large number of readers who have used it and in particular to those of them who have sent helpful suggestions from time to time for the improvement of the book.

In the present edition, authors have made sincere efforts to make the book up-to-date. A notable feature of this edition is the inclusion of **Value Based Questions**. These questions will not only create general awareness among the students but will also help them to understand the theoretical and practical aspects of physics. It is hoped that these features will make the book more useful to the students.

We are thankful to the Management Team and Editorial Department of S.Chand & Company Pvt. Ltd. for all help and support in the publication of this book.

Errors might have crept in despite utmost care to avoid them and authors shall be grateful if these are pointed out alongwith other suggestions for the improvement of the book.

V.K. MEHTA
ROHIT MEHTA

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CBSE SYLLABUS

CLASS XII

Unit I: Electrostatics

(Periods 25)

Electric Charges; Conservation of charge, Coulomb's law-force between two point charges, forces between multiple charges; superposition principle and continuous charge distribution. Electric field, electric field lines, electric field due to a point charge; electric dipole, electric field due to a dipole at axial and equatorial position; torque on a dipole in uniform electric field. Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside).

Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipole in an electrostatic field.

Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarisation, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with dielectric medium between the plates, energy stored in a capacitor. Van de Graaff generator.

Unit II: Current Electricity

(Periods 22)

Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current; Ohm's law, electrical resistance, V-I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity. Carbon resistors, colour code for carbon resistors; series and parallel combinations of resistors; effect of temperature on resistance.

emf and potential difference of a cell, internal resistance of a cell, combination of cells in series and in parallel.

Kirchhoff's laws and simple applications. Wheatstone bridge, metre bridge.

Potentiometer - principle and its applications to measure potential difference and for comparing emf of two cells; measurement of internal resistance of a cell.

Unit III: Magnetic Effects of Current and Magnetism

(Periods 25)

Concept of magnetic field, Oersted's experiment.

Biot - Savart law and its application to current carrying circular loop.

Ampere's law and its applications to infinitely long straight wire. Straight and toroidal solenoids, force between two parallel current-carrying conductors-definition of ampere.

Force on a current-carrying conductor in a uniform magnetic field. Torque experienced by a current loop in uniform magnetic field; moving coil galvanometer-its current sensitivity and conversion to ammeter and voltmeter.

Force on a moving charge in uniform magnetic and electric fields. Cyclotron.

Current loop as a magnetic dipole and its magnetic dipole moment. Magnetic dipole moment of a revolving electron. Magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis. Torque on a magnetic dipole (bar magnet) in a uniform magnetic field; bar magnet as an equivalent solenoid, magnetic field lines; Earth's magnetic field and magnetic elements.

Para-, dia- and ferro - magnetic substances, with examples. Electromagnets and factors affecting their strengths. Permanent magnets.

Unit IV: Electromagnetic Induction and Alternating Currents (Periods 20)

Electromagnetic induction; Faraday's law, induced emf and current; Lenz's Law, Eddy currents. Self and mutual inductance, displacement current.

Alternating currents, peak and rms value of alternating current/voltage; reactance and impedance;

LC oscillations (qualitative treatment only), LCR series circuit, resonance; power in AC circuits, wattless current.

AC generator and transformer.

Unit V: Electromagnetic Waves (Periods 4)

Displacement current, Electromagnetic waves and their characteristics (qualitative ideas only).

Transverse nature of electromagnetic waves.

Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, gamma rays) including elementary facts about their uses.

Unit VI: Optics (Periods 30)

Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and its applications, optical fibres, refraction at spherical surfaces, lenses, thin lens formula, lensmaker's formula. Magnification, power of a lens, combination of thin lenses in contact. Refraction and dispersion of light through a prism, rainbow.

Wave optics: wave front and Huygens' principle, reflection and refraction of plane wave at a plane surface using wave fronts. Proof of laws of reflection and refraction using Huygens' principle. Interference, coherent sources, Young's double slit experiment and expression for fringe width. Diffraction due to a single slit, width of central maximum. Polarisation, plane polarised light; malus law, Brewster's law, uses of plane polarised light and Polaroids.

Optical instruments: Microscopes, astronomical telescopes (reflecting and refracting).

Magnifying powers and resolving power of microscopes and astronomical telescopes.

Unit VII: Dual Nature of Matter and Radiation (Periods 8)

Dual nature of radiation. Photoelectric effect, Experimental observation and their significance, Hertz and Lenard's observations; Einstein's photoelectric equation-particle nature of light.

Matter waves-wave nature of particles, de Broglie relation. Davisson-Germer experiment.

Unit VIII: Atoms & Nuclei (Periods 18)

Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum.

Composition and size of nucleus, atomic masses, isotopes, isobars; isotones. Radioactivity –alpha, beta and gamma particles/rays and their properties; radioactive decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission, nuclear reactor, nuclear fusion.

Unit IX: Electronic Devices

(Periods 18)

Semiconductors; semiconductor diode – I-V characteristics in forward and reverse bias, diode as a rectifier; LED, photodiode, solar cell, and Zener diode; Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR). Transistor as a switch.

Unit X: Communication Systems

(Periods 10)

Elements of a communication system (block diagram only); bandwidth of signals (speech, TV and digital data); bandwidth of transmission medium. Propagation of electromagnetic waves in the atmosphere, sky and space wave propagation. Need for modulation. Production and detection of an amplitude-modulated wave.

CONTENTS

UNIT-1 ELECTROSTATICS

- 1. ELECTRIC CHARGE** 3 – 40
Modern Electron Theory — Nature of Electricity — Two Types of Electric Charges — Electrostatics — Importance of Electrostatics — Conductors and Insulators — Frictional Electricity — Methods of Charging a Conductor — Unit of Electric Charge — Basic Properties of Electric Charge — Additive Nature of Electric Charge — Quantization of Electric Charge — Conservation of Electric Charge — Summary of Properties of Electric Charge — Comparison of Electric Charge and Mass — Coulomb's Law of Electrical Force — Coulomb's Law in Vector Form — Definition of 1 Coulomb from Coulomb's Law — Relative Permittivity or Dielectric Constant — Force Between Two Charges in terms of Position Vectors — The Superposition Principle — Electrostatic Force due to Continuous Charge Distribution — **Competition Success Material**
- 2. ELECTRIC FIELD** 41 – 81
Electric Field — Electric Field Intensity — Physical Significance of Electric Field — Electric Field Intensity due to a Point Charge — Electric Field Intensity due to a Group of Point Charges — Field Intensity due to a Continuous Charge Distribution — Electric Field Intensity due to Uniformly Charged Ring — Rectangular Components of \vec{E} due to Point Charge — Electric Lines of Force (or Field Lines) — Properties of Electric Lines of Force — Field Lines due to Some Charge Configurations — Electric Dipole — Dipole Moment (\vec{p}) — Dipole Field — Field Intensity on the Axial Line of Dipole — Field Intensity on the Equatorial Line of Dipole — Electric Field at any Point due to Short Electric Dipole — Torque on Dipole in Uniform Electric Field — Potential Energy of Dipole in Uniform Electric Field — Work Done in Rotating Dipole in Uniform Electric Field — **Competition Success Material**
- 3. ELECTROSTATIC POTENTIAL AND FLUX** 82 – 154
Electrostatic Potential Energy — Electrostatic Potential — SI Unit of Electric Potential — Electric Potential Difference — Line Integral of Electrostatic Field — Electrostatic Force is a Conservative Force — Electric Potential due to a Single Point Charge — Potential at a Point due to a Group of Point Charges — Potential due to Continuous Charge Distribution — Potential at a Point due to Electric Dipole — Equipotential Surfaces — Some Cases of Equipotential Surfaces — Importance of Equipotential Surfaces — Electric Field Intensity and Potential Difference — The Electron Volt (eV) — Electric Potential Energy — Electric Potential Energy of Two Charge System — Electric Potential Energy due to Group of Point Charges — Potential Energy of Charges in External Field — Area Vector — Electric Flux — Gauss's Law in Electrostatics — Proof of Gauss's Law — Gaussian Surface — Derivation of Coulomb's Law from Gauss's Law — Applications of Gauss's Law — Electric Field Intensity due to Line Charge — Electric

Field Intensity due to a Uniformly Charged Spherical Shell — Electric Field Intensity due to a Non-conducting Uniformly Charged Solid Sphere — Electric Field Intensity due to Infinite Plane Sheet of Charge — Electric Field Intensity due to Two Thin Infinite Parallel Sheets of Charge — Electric Field Intensity Near a Charged Metal Plate — **Competition Success Material**

4. CAPACITANCE

155 – 222

Behaviour of Metallic Conductors in Electric Field — Electrostatic Shielding — Capacitor — How Does Capacitor Store Charge? — Capacitance — Units of Capacitance — Capacitance of an Isolated Spherical Conductor — Capacitance of a Spherical Capacitor — Capacitance of Parallel Plate Air Capacitor — Relative Permittivity or Dielectric Constant — Grouping of Capacitors — Capacitance of Cylindrical Capacitor — Energy Stored in a Charged Capacitor — Total Energy Stored in Grouping of Capacitors — Energy Density of Electric Field—Common Potential — Loss of Energy on Sharing of Charges — Dielectrics — Behaviour of Dielectric in External Electric Field — Some Definitions — Dielectric Strength — Capacitance of Parallel Plate Capacitor with Conducting Slab Between Plates — Capacitance of Parallel Plate Capacitor with Dielectric Slab Between Plates — Discharging Effect of Sharp Points — Lightning Conductors — Van De Graff Generator — **Competition Success Material**

NCERT Textbook Exercises

223 – 249

UNIT- II CURRENT ELECTRICITY

5. ELECTRIC CURRENT AND RESISTANCE

253 – 327

Current Electricity — Electromotive Force(E.M.F.) — Electric Current — Current Carriers — Electric Current is a Scalar Quantity — Types of Electric Current — Current Conduction in Metallic Conductors — Relation Between Electric Field and Drift Velocity — Relation Between Current and Drift Velocity — Electron Mobility — Current Density—Ohm's Law — Validity of Ohm's Law — Resistance of a Conductor — Factors upon which Resistance Depends — Conductance — Classification of Materials on Electrical Conductivity — Variation of Resistivity with Temperature — Effect of Temperature on Resistance — Carbon Resistors — Nonohmic Conductors — Thermistors — Superconductivity — D.C. Circuit — Resistors in Series — Resistors in Parallel — Two Resistors in Parallel — Internal Resistance of a Cell — Terminal Potential Difference of a Cell — Difference Between E.M.F. and Potential Difference — Battery and its Need — Cells in Series (Series Grouping) — Cells in Parallel (Parallel Grouping) — Series-Parallel Grouping of Cells (Mixed Grouping) — Efficiency of a Cell — **Competition Success Material**

6. ELECTRICAL MEASUREMENTS

328 – 368

Complex Circuits — Kirchhoff's Laws — Sign Convention — Illustrations of Kirchhoff's Laws — Steps to Solve Circuit by Kirchhoff's Laws — Wheatstone Bridge — Measurement of Temperature by Wheatstone Bridge — Potentiometer — To Find Potential Difference by Potentiometer—Comparison of E.M.Fs.of Two Cells by Potentiometer — To Find Internal Resistance of Cell by Potentiometer — Sensitivity of Potentiometer — Potentiometer versus Voltmeter — Slide Wire Bridge (or Metre Bridge) — **Competition Success Material**

7. HEATING EFFECT OF ELECTRIC CURRENT 369 – 399

Heating Effect of Electric Current — Cause of Heating Effect of Electric Current — Heat Produced in a Conductor by Electric Current — Electric Power — Electrical Energy — Applications of Heating Effect of Electric Current — Efficiency of Electric Device — Maximum Power Transfer Theorem — **Competition Success Material**
NCERT Textbook Exercises 400 – 409

UNIT-III
MAGNETIC EFFECTS OF CURRENT AND MAGNETISM

8. MAGNETIC FIELD DUE TO ELECTRIC CURRENT 413 – 470

Oersted's Discovery — Magnetic Field — Magnetic Flux Density (\vec{B}) — Definition of Magnetic Field (\vec{B}) — Some Cases of Magnetic Force (F_m) — Units and Dimensions of \vec{B} — Biot-Savart Law — Biot-Savart Law versus Coulomb's Law in Electrostatics — Magnetic Field due to Straight Conductor Carrying Current — Magnetic Field at the Centre of Current Carrying Circular Coil — Magnetic Field on the Axis of Circular Coil Carrying Current — Ampere's Circuital Law — Application's of Ampere's Circuital Law — Magnetic Field due to Straight Conductor Carrying Current — Magnetic Field due to a Long Current Carrying Solenoid — Magnetic Field due to a Toroid — **Competition Success Material**

9. MOTION OF CHARGED PARTICLES IN ELECTRIC AND MAGNETIC FIELDS 471 – 547

Motion of Charged Particle in a Uniform Electric Field — Motion of Charged Particle in Uniform Magnetic Field — Velocity Selector—Cyclotron — Limitations of Cyclotron — Force on Current Carrying Conductor Placed in Uniform Magnetic Field — Force Between Two Parallel Conductors Carrying Current — Definition of Ampere — Force Between Two Parallel Moving Charges — Differences Between Electric and Magnetic Forces — Torque on a Current Carrying Loop in Uniform Magnetic Field — Moving Coil Galvanometer — Sensitivity of Moving Coil Galvanometer — Advantages of Moving Coil Galvanometer — Conversion of Galvanometer into Ammeter — Conversion of Galvanometer into Voltmeter — **Competition Success Material**

10. MAGNETS AND EARTH'S MAGNETISM 548 – 601

Natural and Artificial Magnets — Properties of Magnet—Modern View about Magnetism — Coulomb's Law of Force for Magnetic Poles — Magnetic Field — Uniform and Non-uniform Magnetic Field — Magnetic Dipole — Magnetic Flux Density at a Point due to Bar Magnet — Current Loop as a Magnetic Dipole — A Solenoid as an Equivalent Bar Magnet — Torque on a Bar Magnet in a Uniform Magnetic Field — Potential Energy of a Magnetic Dipole in a Uniform Magnetic Field — Work Done in Rotating a Magnetic Dipole in Uniform Magnetic Field — Gauss's Law in Magnetism — Earth's Magnetism — Cause of Earth's Magnetism — Some Facts about Earth's Magnetic Field — Elements of Earth's Magnetism — Useful Information about Angle of Dip — Variation of Earth's Magnetic Field — Neutral Points — Tangent Law in Magnetism — Tangent Galvanometer — **Competition Success Material**

11. CLASSIFICATION OF MAGNETIC MATERIALS

602 – 634

Atom as a Magnetic Dipole — Important Terms Used in Magnetism — Relation Between μ_r and χ_m — Classifications of Magnetic Materials—Diamagnetic Substances — Paramagnetic Substances—Curie Law — Ferromagnetic Substances — Hysteresis — Hysteresis Loss — Importance of Hysteresis Loop — Applications of Ferromagnetic Materials — **Competition Success Material**

NCERT Textbook Exercises

635 – 655

UNIT-IV

ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENTS

12. ELECTROMAGNETIC INDUCTION

659 – 715

Magnetic Flux — Units of Magnetic Flux — Electromagnetic Induction — Flux Linkages — Faraday's Laws of Electromagnetic Induction — Direction of Induced E.M.F. and Current — Motional E.M.F. in a Conductor — Various Methods of Producing Induced E.M.F. — Eddy Currents—Self Induction — Coefficient of Self Induction (or Self Inductance) — Inductance of a Long Solenoid — Energy Stored in an Inductor — Mutual Induction — Coefficient of Mutual Induction (or Mutual Inductance) — Coefficient of Coupling(k) — Mutual Inductance Between Two Long Solenoids — Inductances in Series — Inductances in Parallel — **Competition Success Material**

13. ALTERNATING CURRENTS

716 – 781

Alternating Voltage and Current — Mean or Average Value of A.C. — Mean or Average Value of Alternating E.M.F.—R.M.S. Value of A.C. — R.M.S. Value of Alternating E.M.F.— Importance of R.M.S. Values — Phasor Representation of Alternating Voltages/Currents — A.C. Circuit — A.C. Circuit Containing Resistance Only — A.C. Circuit Containing Inductance Only — A.C. Circuit Containing Capacitance Only — A.C. Circuit Containing R and L in Series — Impedance Triangle — Power Triangle — Power Factor — Wattless Current — A.C. Circuit Containing R and C in Series — R - L - C Series A.C. Circuit — Resonance in R - L - C Series A.C. Circuit — Q -Factor of Series Resonant Circuit — Resonance in Parallel A.C. Circuit — LC Oscillations — Mathematical Treatment of LC Oscillations— Conservation of Energy in LC Oscillations — Analogy Between Mechanical and Electrical Quantities — A.C. Versus D.C. — **Competition Success Material.**

14. ELECTRICAL DEVICES

782 – 812

E.M.F. Induced in a Rotating Coil — A.C. Generator (or Alternator) — Polyphase A.C. Generator — D.C. Generator — D.C. Motor — Back E.M.F. in a D.C. Motor — Necessity of Motor Starter — Transformer — Power Losses in a Transformer — Uses of Transformer — Choke Coil — **Competition Success Material.**

NCERT Textbook Exercises

813 – 830

UNIT-V

ELECTROMAGNETIC WAVES

15. ELECTROMAGNETIC WAVES

833 – 870

Inconsistency of Ampere's Circuital Law — Generalised Form of Ampere's Law — Expression for Displacement Current (I_d) — Maxwell's Equations — Electro-

magnetic Waves — Transverse Nature of Electromagnetic Waves — Speed of Electromagnetic Waves — Average Density of Electromagnetic Waves — Intensity of Electromagnetic Waves — Important Properties of Electromagnetic Waves — Generation of Electromagnetic Waves — Hertz Experiment — Electromagnetic Spectrum — Uses of Electromagnetic Spectrum — Microwave Oven — **Competition Success Material.**

NCERT Textbook Exercises

871 – 876

UNIT-VI OPTICS

16. REFLECTION OF LIGHT

879 – 910

Reflection of Light — Properties of Image Formed by a Plane Mirror — Spherical Mirrors — Important Ray Paths — New Cartesian Sign Convention — Relation Between f and R — Mirror Formula — Mirror Formula for Concave Mirror — Mirror Formula for Convex Mirror — Linear Magnification — Image Formation by a Concave Mirror — Image Formation by a Convex Mirror — Uses of Spherical Mirrors — **Competition Success Material.**

17. REFRACTION OF LIGHT

911 – 982

Refraction of Light — Laws of Refraction — Refractive Index — Principle of Reversibility of Light — Refraction through a Rectangular Glass Slab — Real and Apparent Depth — Atmospheric Refraction — Refraction of Light Through a Compound Slab — Total Internal Reflection — Applications of Total Internal Reflection — Spherical Refracting Surfaces — New Cartesian Sign Convention — Refraction at Convex Spherical Surface (Rarer to Denser) — Refraction at Concave Spherical Surface (Denser to Rarer) — Refraction at Concave Spherical Surface — Summary of Refraction at Spherical Refracting Surfaces — Lenses — Important Terms Related to Lenses — Refraction through a Lens — Lens Maker's Formula — Lens Maker's Formula for Double Concave Lens — Principle Foci of a Lens — Derivation of Lens Formula for Convex Lens — Derivation of Lens Formula for Concave Lens — Ray Diagrams for Lenses — Image Formation by a Convex Lens — Image Formation by a Concave Lens — Linear Magnification — Power of a Lens — Combination of Thin Lenses — Equivalent Focal Length of Two Thin Lenses in Contact — Important Points about Thin Lenses in Contact — **Competition Success Material.**

18. DISPERSION OF LIGHT

983 – 1008

Prism — Refraction through Prism — Minimum Deviation — Refractive Index of Prism Material — Dispersion of Light — Angular Dispersion — Dispersive Power — Scattering of Light by Atmosphere — Rainbow — **Competition Success Material.**

19. OPTICAL INSTRUMENTS

1009 – 1050

Human Eye — Accommodation of the Eye — Defects of Vision — Visual Angle — Microscopes — Simple Microscope or Magnifying Glass — Compound Microscope — Telescopes — Astronomical (Refracting) Telescope — Terrestrial (Refracting) Telescope — Reflecting Type Telescope — Advantages and Disadvantages of Reflecting Telescopes — Difference Between Refracting and Reflecting Telescopes — **Competition Success Material.**

20. PHOTOMETRY **1051 – 1070**

Photometry — Sources of Light — Luminous Efficiency of Electric Light Sources — Illuminance or Intensity of Illumination (E) — Lambert's Cosine Law — Laws of Illuminance (Illumination) – Luminance (or Brightness) — Bunsen's Grease Spot Photometer — **Competition Success Material.**

21. HUYGEN'S PRINCIPLE AND INTERFERENCE **1071 – 1116**

Wavefront — Huygens's Principle — Reflection on the Basis of Wave Theory — Refraction on the Basis of Wave Theory — Effect of Refraction on Frequency and Wavelength — Behaviour of Prism, Lens and Spherical Mirror Towards Plane Wavefront — Superposition Principle — Interference of Light Waves — Phase Difference and Path Difference — Young's Double Slit Experiment — Conditions for Constructive and Destructive Interference (Mathematical Treatment) — Calculation of Fringe Width — Intensity Distribution Curve for Interference — Conservation of Energy in Interference — Coherent and Incoherent Sources — Conditions for Sustained Interference — Interference in Thin Films — Colours in Thin Films — Fringe Shift — **Competition Success Material.**

22. DIFFRACTION AND POLARISATION **1117 – 1160**

Diffraction of Light — Examples of Diffraction of Light — Types of Diffraction — Diffraction of Light at a Single Slit — Linear Width of Central Maximum — Difference between Interference and Diffraction of Light — Validity of Ray Optics — Resolving Power of Optical Instruments — Resolving Power of Microscope — Resolving Power of Telescope — Doppler Effect in Light — Polarisation of Waves — Polarisation of Light — Representation of Unpolarised (Ordinary) Light — Changing Ordinary Light into Polarised Light by Polaroid — Detection of Polarised Light — Law of Malus — Polarisation of Light by Reflection — Brewster's Law — Polarisation of Light by Double Refraction — Polarisation by Scattering — Uses of Polaroids (or Polarised Light) — **Competition Success Material**

NCERT Textbook Exercises

1161 – 1186

UNIT-VII
DUAL NATURE OF RADIATION AND MATTER

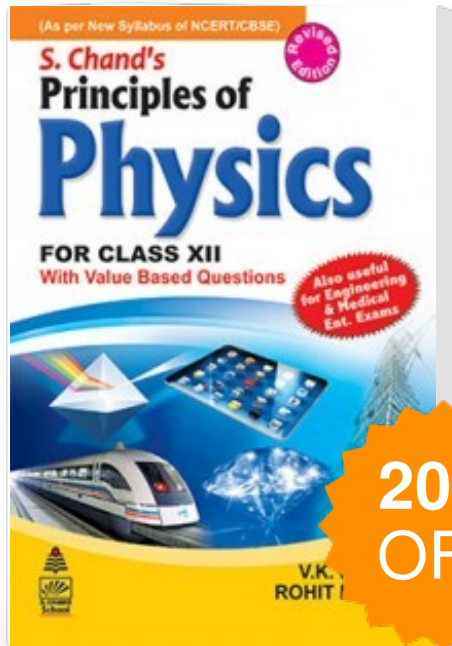
23. DUAL NATURE OF RADIATION AND MATTER **1189 – 1241**

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