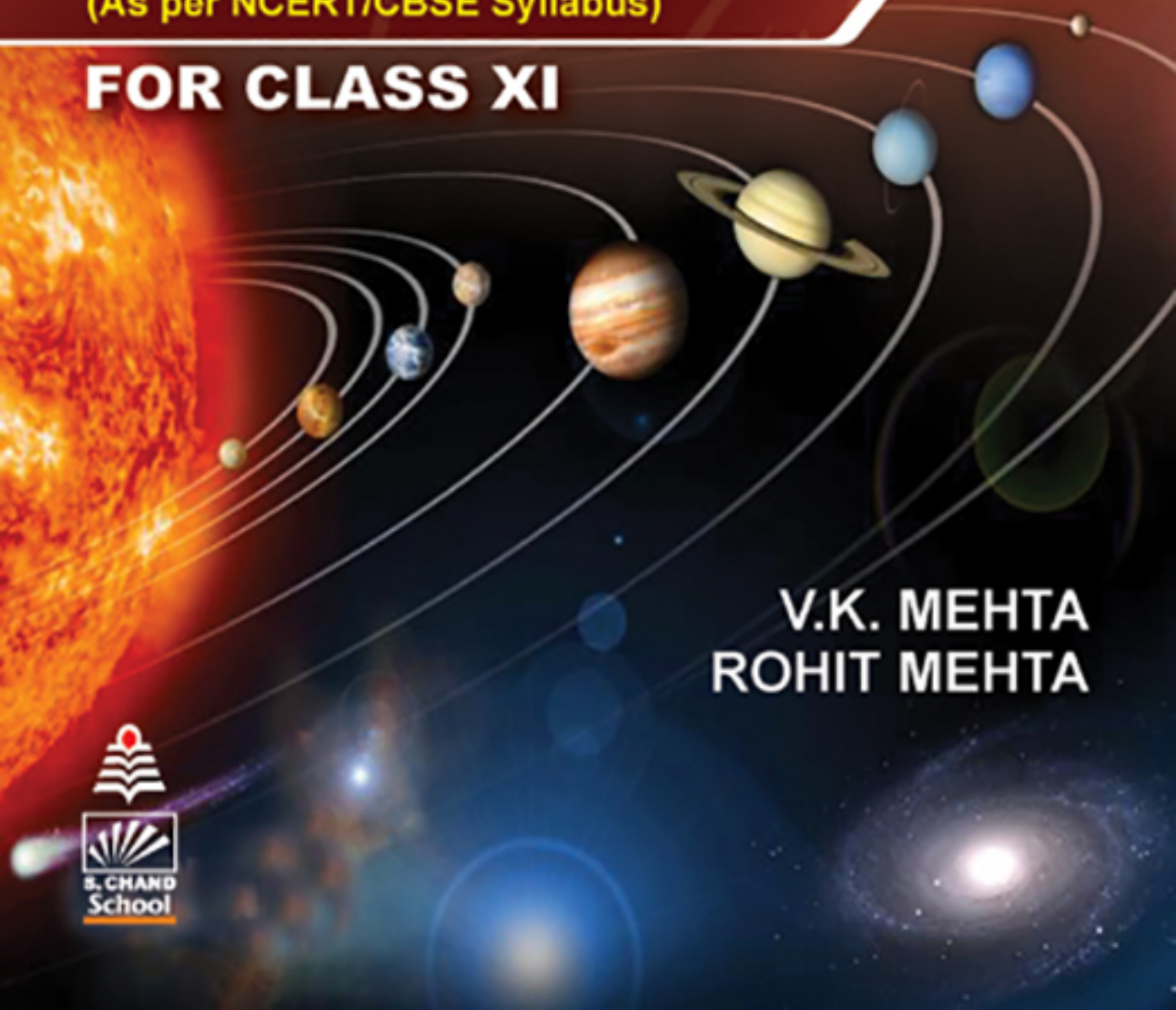
Revised Edition

S. Chand's Principles of Physics

(As per NCERT/CBSE Syllabus)

FOR CLASS XI



V.K. MEHTA
ROHIT MEHTA

S. CHAND School

S. Chand's

Principles of

Physics

For

CLASS XI

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

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Senior Secondary Certificate Examinations of CBSE and Other State Boards of School Education

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S. CHAND & COMPANY PVT. LTD.
(AN ISO 9001 : 2008 COMPANY)
RAM NAGAR, NEW DELHI-110 055

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***Head Office*: 7361, RAM NAGAR, NEW DELHI - 110 055**
Phone: 23672080-81-82, 9899107446, 9911310888
Fax: 91-11-23677446
Shop at: schandgroup.com; e-mail: info@schandgroup.com

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PREFACE TO THE SEVENTH EDITION

The general response to the fifth 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. There are many notable features of this edition including **Answers to very short answer questions**, **Answers to short answer questions** and **solution of NCERT Textbook exercises**. Keeping in view the growing demands of fast developing science and technology, a large number of practical problems have been added to make the book practically oriented. It is hoped that these features will make the book more useful to the students.

We are thankful to the Management Team and the Editorial Department of S. Chand & Company Pvt. Ltd., New Delhi 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

SYLLABUS

Class–XI

Unit I: Physical World and Measurement **(Periods 10)**

Physics - scope and excitement; nature of physical laws; Physics, technology and society.

Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures.

Dimensions of physical quantities, dimensional analysis and its applications.

Unit II: Kinematics **(Periods 30)**

Frame of reference, Motion in a straight line: Position-time graph, speed and velocity.

Elementary concepts of differentiation and intergration for describing motion.Uniform and nonuniform motion, average speed and instantaneous velocity. Uniformly accelerated motion, velocitytime and position-time graphs.

Relations for uniformly accelerated motion (graphical treatment).

Scalar and vector quantities; Position and displacement vectors, general vectors and their notations; equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors. Relative velocity.

Unit vector; Resolution of a vector in a plane - rectangular components. Scalar and Vector product of vectors.

Motion in a plane. Cases of uniform velocity and uniform acceleration-projectile motion. Uniform circular motion.

Unit III: Laws of Motion **(Periods 16)**

Intuitive concept of force. Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion.

Law of conservation of linear momentum and its applications.

Equilibrium of concurrent forces. Static and kinetic friction, laws of friction, rolling friction, lubrication.

Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on a level circular road, vehicle on banked road).

Unit IV: Work, Energy and Power **(Periods 16)**

Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power.

Notion of potential energy, potential energy of a spring, conservative forces: conservation of mechanical energy (kinetic and potential energies); non-conservative forces: motion in a vertical circle; elastic and inelastic collisions in one and two dimensions.

Unit V: Motion of System of Particles and Rigid Body **(Periods 18)**

Centre of mass of a two-particle system, momentum conservation and centre of mass motion.

Centre of mass of a rigid body; centre of mass of a uniform rod.

Moment of a force, torque, angular momentum, laws of conservation of angular momentum and is applications.

Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions.

Moment of inertia, radius of gyration. Values of moments of inertia, for simple geometrical objects (no derivation). Statement of parallel and perpendicular axes theorems and their applications.

Unit VI: Gravitation **(Periods 14)**

Keplar's laws of planetary motion. The universal law of gravitation.

Acceleration due to gravity and its variation with altitude and depth.

Gravitational potential energy and gravitational potential. Escape velocity. Orbital velocity of a satellite. Geo-stationary satellites.

Unit VII: Properties of Bulk Matter **(Periods 28)**

Elastic behaviour, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear modulus of rigidity, Poisson's ratio; elastic energy.

Pressure due to a fluid column; Pascal's law and its applications (hydraulic lift and hydraulic brakes). Effect of gravity on fluid pressure.

Viscosity, Stokes' law, terminal velocity, Reynold's number, streamline and turbulent flow, critical velocity. Bernoulli's theorem and its applications.

Surface energy and surface tension, angle of contact, excess of pressure accros a curved surface, application of surface tension ideas to drops, bubbles and capillary rise.

Heat, temperature, Thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion of water; specific heat capacity; Cp, Cv - calorimetry; change of state - latent heat capacity.

Heat transfer-conduction, convection and radiation, thermal conductivity, Newton's law of cooling, Qualitative ideas of Blackbody radiation , Wein's displacement Law, Stefan's law Green house effect.

Unit VIII: Thermodynamics **(Periods 12)**

Thermal equilibrium and definition of temperature (zeroth law of thermodynamics). Heat, work and internal energy. First law of thermodynamics. Isothermal and adiabatic processes.

Second law of thermodynamics: reversible and irreversible processes. Heat engine and refrigerator.

Unit IX: Behaviour of Perfect Gases and Kinetic Theory of Gases **(Periods 8)**

Equation of state of a perfect gas, work done in compressing a gas.

Kinetic theory of gases - assumptions, concept of pressure. Kinetic interpretation of temperature; rms speed of gas molecules; degrees of freedom, law of equipartition of energy (statement only) and application to specific heat capacities of gases; concept of mean free path, Avogadro's number.

Unit X: Oscillations and Waves **(Periods 28)**

Periodic motion - time period, frequency, displacement as a function of time. Periodic functions. Simple harmonic motion (S.H.M) and its equation; phase; oscillations of a spring–restoring force and force constant; energy in S.H.M. Kinetic and potential energies; simple pendulum–derivation of expression for its time period.

Free, forced and damped oscillations (qualitative ideas only), resonance.

Wave motion. Transverse and longitudinal waves, speed of wave motion. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler effect.

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PHYSICAL WORLD AND MEASUREMENT

UNIT II
KINEMATICS
(Description of Motion in One Dimension)

UNIT III
KINEMATICS
(Description of Motion in Two and Three Dimensions)

UNIT VII
GRAVITATION

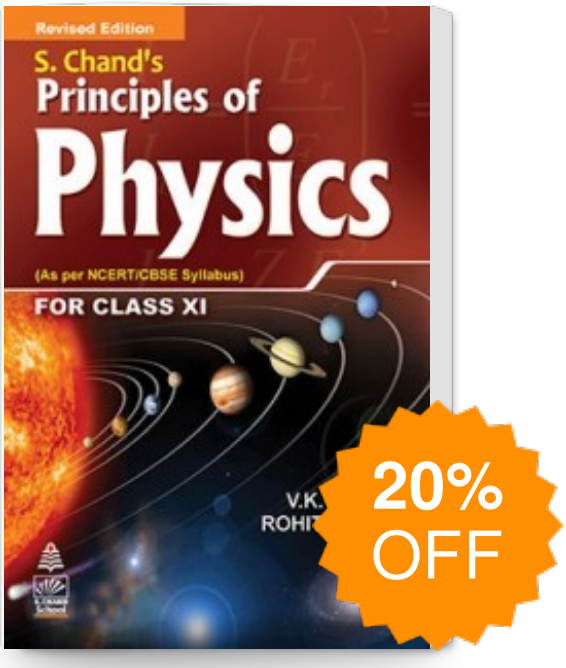
UNIT VIII
PROPERTIES OF BULK MATTER

UNIT IX
THERMODYNAMICS

UNIT X
BEHAVIOUR OF PERFECT GAS AND KINETIC THEORY

UNIT XI
OSCILLATIONS AND WAVES

S. Chand's Principles Of Physics For XI



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Author : V K Mehta And Rohit Mehta

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