

## Odisha Board Class 11 Physics Syllabus

# PHYSICS

(Theory)

+2 1<sup>st</sup> Year Science

(Detailed Syllabus)

No. of Periods – 160

### **Unit-I Physical world and Measurement (10 Periods)**

Physics and its scope, Physics, Technology and Society. Measurement, need for measurement, units of measurement, fundamental and derived units, SI Units, accuracy and precision of measuring instruments, errors in measurement, absolute, relative error, percentage of error, Combination of errors, significant figures.

Dimensions of Physical quantities. Dimensional analysis and its applications.

### **Unit – II Kinematics.**

**(24 Periods)**

#### 1. Motion in a straight line :

Rest and motion, Frame of reference, motion in a Straight line, position – time graph, speed and velocity. Concepts of differentiation and integration for describing motion (elementary idea), uniform and non-uniform motion, average speed and instantaneous velocity, uniformly accelerated motion, velocity – time and position – time graph, Relation for uniformly accelerated motion (graphical treatment)

#### 2. Motion in a plane :

Scalars and vectors, general vectors and their notations, position and displacement vectors, equality of vectors, unit vectors, multiplication of vectors by a real number, addition and subtraction of vectors, relative velocity, resolution of a vector in a plane, rectangular components, Dot and Cross products of two vectors.

Motion in a plane, cases of uniform velocity and uniform acceleration – projectile motion (equation of trajectory, range, time of flight, maximum height); uniform circular motion.

**Unit-III      Laws of Motion      (14 Periods)**

Concept of force, Newton's first law, inertia, momentum and Newton's 2<sup>nd</sup> law, impulse, impulse-momentum theorem, Newton's 3<sup>rd</sup> law, Law of Conservation of linear momentum and its application. Equilibrium of Concurrent forces, static and Kinetic friction, laws of friction, rolling friction, lubrication.

Dynamics of uniform circular motion, Centripetal force, motion of a vehicle on a level circular road and vehicle on a banked road.

**Unit-IV      Work, Energy and Power      (12 Periods)**

Work done by a Constant force and variable force, kinetic energy, work-energy theorem, power. Notion of potential energy, potential energy of a spring, conservative and non-conservative forces, conservation of mechanical energy (Kinetic and Potential energies), motion in a vertical circle, elastic and in-elastic collisions in one and two dimensions.

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

System of Particles and Rotational Motion :

Centre of mass of a two-particle system, momentum conservation and centre of mass motion, centre of mass of rigid bodies, Centre of Mass of a uniform rod.

Moment of a force, torque, angular momentum, conservation of angular momentum with its applications.

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

Moment of inertia, radius of gyration, moment of inertia of simple geometrical objects (no derivation). Parallel and perpendicular axes theorem and their applications.

**Unit-VI      Gravitation      (12 Periods)**

Newton's law of gravitation, Kepler's laws of planetary motion (only statements), Gravitational field and Potential, gravitational potential energy, acceleration due to gravity and its variation with altitude and depth, Escape velocity, orbital velocity of a satellite, Geostationary satellites,

**Unit-VII      Properties of Bulk Matter      (24 Periods)**

1. Mechanical properties of Solids:

Elastic Behaviours, Stress, Strain, Hooke's Law, Stress-Strain diagram, Young's modulus, Bulk modulus, Shear modulus of rigidity, Poisson's ratio, elastic energy.

2. Mechanical properties of fluids:

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

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

Viscosity, Stoke's law, terminal velocity, streamline and turbulent flow, critical velocity, Bernoulli's theorem and its application.

3. Thermal properties of matter:

Concepts of heat and temperature, Thermal expansion of solids, liquids and gases, anomalous expansion of water, specific heat capacity :  $C_p$ ,  $C_v$ . Calorimetry, change of state, latent heat capacity .

Heat transfer: Conduction, Convection and radiation, thermal conductivity, qualitative ideas of black body radiation, Wien's displacement law, Stefan's law, Greenhouse effect.

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

Thermal equilibrium, 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, Carnot's engine and refrigerator, Efficiency of Carnot's engine (no derivation).

**Unit-IX Kinetic theory of gases: (08 Periods)**

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

Kinetic theory of gases- Postulates, concept of pressure, kinetic interpretation of temperature, mean and RMS speed of gas molecules, degrees of freedom, law of equipartition of energy (statement only) and its applications to specific heat of gases, concept of mean free path and Avogadro's number.

**Unit-X Oscillation and waves (26 Periods)**

1. Periodic motion: Period, Frequency, displacement as a function of time, periodic function. Simple harmonic motion and its equation, phase, oscillation of a spring, Restoring force and force constant, kinetic and potential energy in SHM, simple pendulum, derivation of expression for its time period.

Free, damped and forced oscillation (qualitative idea only), resonance.

2. Waves:

Wave motion, transverse and longitudinal waves, speed of wave motion, displacement relation for a progressive wave, speed of longitudinal wave in an elastic medium and speed of transverse wave in a stretched string (qualitative idea only), principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler's effect.

**Books Recommended :**

1. Bureau's Higher Secondary (+2) Physics Vol.-I published by Odisha State Bureau of Text Book Preparation and Production; Bhubaneswar.

**UNIT WISE MARK DISTRIBUTION (Physics Theory)**

Time- 3 hours

Max. Marks.-70

Units	Subjects	Marks
Unit-I	Physical World and Measurement	23
Unit-II	Kinematics	
Unit-III	Laws of Motion	
Unit-IV	Work, Energy and Power	17
Unit-V	Motion of System of Particles and Rigid Body	
Unit-VI	Gravitation	
Unit-VII	Properties of Bulk Matter	20
Unit-VIII	Thermodynamics	
Unit-IX	Kinetic theory of gases	
Unit-X	Oscillations and Waves	10
	Total	70

### QUESTION WISE BREAK UP

Type of Question	Mark per Question	Total No. of Question	Total Marks
VSA	1	14	14
SA-I	2	7	14
SA-II	3	7	21
LA	7	3	21
TOTAL			70

[VSA-Very Short Answer, SA-Short Answer, LA-Long Answer.]

- Internal Choice : There is no overall choice in the paper. However, there is an internal choice in one question of 2 marks weightage, one question of 3 marks weightage and all the three questions of 7 marks weightage.
- The above template is only a sample. Suitable internal variations may be made for generating similar templates keeping the overall weightage to different form of questions and typology of questions same.