DEPARTMENT OF SCHOOL EDUCATION

TAMIL NADU

Syllabus

2020 - 21

STANDARD - 11

State Council of Educational Research and Training
Chennai 600 006

SYLLABUS 2020-2021

STANDARD: 11 **SUBJECT: PHYSICS**

UNIT	CONTENT	
1. Nature of Physical world and Measurement	1.1	Science - Introduction
	1.1.1	The Scientific Method
	1.2	Physics Information
	1.2.1	Branches of physics
	1.2.2	Scope and Excitement of Physics
	1.3	Physics in Relation to technology and society
	1.5.1	(ii) Measurement of Large distance
	1.5.3	Measurement of Time intervals
	1.6	Theory of errors
	1.6.1	Accuracy and precision
	1.6.2	Errors in measurement
	1.6.3	Error Analysis
	1.6.4	Propagation of errors
	1.7	Significant Figures
	1.7.1	Definition and rules of significant figures
	1.7.2	Rounding off
	1.7.3	Arithmetical operations and significant figures
	1.8	Dimensional analysis
	1.8.1	Dimension of Physical Quantities
	1.8.2	Dimensional quantities, Dimensionless quantities, Principle of homogeneity
	1.8.3	Application and limitations of the method of Dimensional analysis
2. Kinematics	2.1	Introduction
	2.2	concept of Rest and Motion
	2.3.3	Addition of vectors
	2.3.4	Subtraction of vectors
	2.4	Components of a vector
	2.4.1	Vector addition using components
	2.5	Multiplication of vector by a scalar
	2.5.1	Scalar product of two vectors
	2.5.2	The vector product of two vector

	2.5.3	Properties of the components of vector
	2.10	Motion along one dimension
	2.10.1	Average velocity
	2.10.2	Relative velocity in one and two dimensional motion
	2.10.3	Equations of uniformly accelerated motion by calculus method
	2.11	Projectile Motion
	2.11.1	Introduction
	2.11.2	Projectile in horizontal projection
	2.11.3	Projectile under an angular projection
	2.11.4	Introduction to Degrees and radians
	2.11.5	Angular diplacement
	2.11.6	Cicular motion
3. Laws of motion	3.1	Introduction
	3.2	Newton's laws
	3.3	Applications of Newton's laws
	3.3.1	Free body diagram
	3.3.2	Particle moving in an inclined plane
	3.3.3	Two bodies in contact on a Horizontal surface
	3.3.4	Motion of connected bodies
	3.3.5	Concurrent Forces and Lami's Theorem
	3.6	Friction
	3.6.1	Introduction
	3.6.2	Static friction
	3.6.3	Kinetic friction
	3.6.4	To move an object- push or pull? Which is easier?
	3.6.5	Angle of Friction
	3.6.6	Angle of repose
	3.6.7	Application of angle of repose
	3.6.8	Rolling Friction
	3.7	Dynamics of circular motion
	3.7.2	Vehicle on a leveled circular road
	3.7.3	Banking of tracks

4. Work, energy and power	4.1	Introduction
	4.1.2	Workdone by a constant force
	4.2	Energy
	4.2.1	Kinetic Energy
	4.2.2	Work- Kinetic Energy Theorem
	4.2.3	Relation between Momentum and Kinetic energy
	4.2.4	Potential Energy
	4.3	Power
	4.3.1	Definition of power
	4.3.2	Unit of power
	4.4	Collisions
	4.4.1	Types of collisions
	4.4.2	Elastic collisions in one dimension
	4.4.4	Loss of kinetic energy in perfect inelastic collision
5. Motion of system of particles and rigid bodies	5.1	Introduction
	5.1.1	Centre of mass
	5.1.2	Center of Mass of a Rigid Body
	5.1.3	Center of Mass for Distributed point masses
	5.1.4	Center of Mass of Two point masses
	5.1.5	Center of mass for uniform distribution of mass
	5.2	Torque and Angular Momentum
	5.2.1	Definition of Torque
	5.2.2	Torque about an axis
	5.2.3	Torque and Angular Acceleration
	5.2.4	Angular Momentum
	5.2.5	Angular Momentum and Angular Velocity
	5.2.6	Torque and angular Momentum
	5.3.2	Couple
	5.3.3	Principle of moments
	5.3.4	Center of Gravity
	5.3.5	Bending of cyclist in curves
	5.4	Moment of inertia
	5.4.1	Moment of inertia of a uniform Rod

	5.5	Rotational Dynamics
	5.5.1	Effect of Torque on Rigid Bodies
	5.5.3	Work done by Torque
	5.5.4	Kinetic Energy in Rotation
	5.5.5	Power delivered by Torque
	5.5.6	Comparison of translational and rotational quantities
	5.6.3	Kinetic energy in pure rolling
	5.6.4	Rolling on Inclined plane
6. Gravitation	6.1	Introduction
	6.2.2	Superposition principle for gravitational field
	6.2.3	Gravitational potential energy
	6.2.4	Gravitational potential energy near the surface of the earth
	6.2.5	Gravitational potential v(r)
	6.3	Acceleration due to gravity of the earth
	6.3.1	Variation of g with altitude, depth and latitude
	6.4	Escape speed and orbital speed
	6.4.1	Satellites, orbital speed and time period
	6.4.2	Energy of an orbiting satellite
	6.4.3	Geo- stationary and polar satellite
	6.4.4	Weightlessness weight of an object
	6.5	Elementary ideas of astronomy
7. Properties of matter	7.1	Introduction
	7.2	Microscopic understanding of various states of matter
	7.2.1	Elastic behaviour of materials
	7.2.2	Stress and strain
	7.2.3	Hooke's law and its experimental verification
	7.2.5	Poisson's ratio
	7.2.6	Elastic energy
	7.2.7	Applications of elasticity
	7.4	Viscosity
	7.4.1	Introduction
	7.4.2	Streamlined flow

	7.4.3	Turbulent flow
	7.4.4	Reynold's number
	7.4.5	Terminal velocity
	7.4.6	Stoke's law and its applications
	7.4.7	Poiseuille's equation
	7.4.8	Applications of viscosity
	7.5.2	Factors affecting the surface tension of a liquid
	7.5.3	Surface energy (s.e.) and surface tension (s.t.)
	7.5.4	Angle of contact
	7.5.5	Excess of pressure inside a liquid drop, a soap bubble, and an air bubble
	7.5.6	Capillarity
	7.5.7	Surface tension by capillary rise method
	7.5.8	Applications of surface tension
	7.6	Bernoulli's theorem
	7.6.1	Equation of continuity
	7.6.3	Bernoulli's theorem and its applications
8. Heat and Thermodynamics	8.1	Heat and Temperature
	8.1.1	Introduction
	8.2.4	Anomalous expansion of water
	8.2.6	Calorimetry
	8.2.8	Newton's law of cooling
	8.3	Laws of Heat transfer
	8.3.1	Prevost theory of heat exchange
	8.3.2	Stefan Boltzman law
	8.3.3	Wien's displacement law
	8.4	Thermodynamics
	8.4.1	Introduction
	8.4.3	Thermodynamics state variables
	8.5	Zeroth law of thermodynamics
	8.6	Internal Energy
	8.6.1	Joule's Mechanical equivalent of heat
	8.6.2	First law of Thermodynamics
	8.6.3	Quasi static process
	8.6.4	Work done in volume changes
	8.6.5	PV Diagram

	8.7.2	Meyer's relation
	8.8	Thermodynamic process
	8.8.1	Isothermal process
	8.8.2	Adiabatic process
	8.8.3	Isobaric process
	8.8.4	Isochoric process
	8.8.5	Cyclic process
	8.8.6	P. V Diagram for a cyclic process
	8.9	Heat engine
	8.9.1	Carnot's ideal heat engine
	8.9.2	Efficiency of a Carnot's engine
	8.9.3	Entropy & Second law of Thermodynamics
9. Kinetic theory of gases	9.1	Kinetic theory
	9.1.1	Introduction
	9.2	Pressure exerted by a gas
	9.2.1	Expression for pressure exerted by a gas
	9.2.2	Kinetic interpretation of temperature
	9.2.3	Relation between, Pressure & mean kinetic Energy
	9.3	Degrees of freedom
	9.3.1	Definition
	9.3.2	Mono atomic Molecule
	9.3.3	Diatomic Molecule
	9.3.4	Triatomic Molecule
	9.4	Laws of equi partition of energy
	9.4.1	Application of law of equipartition of energy in specific heat of gas
	9.5	Mean free path
10. Oscillation	10.1	Introduction
	10.1.1	Periodic and non periodic motion
	10.1.2	Oscillatory motion
	10.2	Simple Harmonic motion
	10.2.1	The Projection of uniform circular motion on a diameter of SHM

	10.2.2	Displacement, Velocity, acceleration and its graphical representation SHM
	10.2.3	Timeperiod, frequency, phase, phase difference and epoch in SHM
	10.4.1	Horizontal oscillation of a spring - mass system
	10.4.2	Vertical Oscillation of a spring
	10.4.3	Combination of springs
	10.4.4	Oscillation of a Simple pendulum in SHM and laws of simple pendulum
	10.5	Energy in SHM
11. Waves	11.1	Introduction
	11.1.1	Ripples and wave formation on the water surface
	11.1.2	Formation of waves on stretched strings
	11.1.3	Formation of waves in a tuning fork
	11.1.4	Characteristics of wave motion
	11.1.5	Mechanical wave motion and its types
	11.1.6	Transverse wave motion
	11.1.7	Longitudinal wave motion
	11.2	Terms and definition used in wave motion
	11.3	Velocity of waves in different media
	11.3.1	Velocity of transverse waves in a stretched string
	11.3.2	Velocity of longitudinal waves in an elastic medium
	11.4	Propagation of sound waves
	11.4.1	Newton's formula for speed of sound waves in air
	11.4.2	Laplace's correction
	11.6	Progressive waves or Travelling wave.
	11.6.1	Characteristics of progressive waves
	11.6.2	Equation of a plane progressive wave
	11.6.3	Graphical representation of wave
	11.6.4	Particle velocity and wave velocity
	11.7	Superposition principle
	11.7.1	Interference of waves
	11.7.2	Formation of beats

	11.8	Standing waves
	11.8.1	Explanation of stationary waves
	11.8.2	Characteristics of stationary waves
	11.8.3	Stationary waves in Sonometer
	11.8.4	Fundamental frequency and over tones
	11.8.5	Laws of transverse vibrations in stretched strings
	11.9	Intensity and loudness
	11.9.1	Intensity of sound
	11.9.2	Loudness of sound
	11.9.3	Intensity and loudness of sound
	11.10	Vibrations of air column

PRACTICAL

STANDARD: 11	SUBJECT: PHYSICS
Sl.No	**Topic**
1	Moment of inertia of a solid sphere of known mass using vernier callipers.
2	Spring constants of a spring
3	Acceleration due to gravity using simple pendulum.
4	Viscosity of a liquid by Stoke's method
5	Study of the relation between frequency and length of the given wire under constant tension using sonometer