

STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TNCF 2017 - DRAFT SYLLABUS

Subject :Physics

Class : XI

TOPIC	CONTENT
Unit 1 : Nature of the Physical World and Measurement	Science – Introduction; Physics- Introduction; Physics in relation with other branches of science; Nature of Physical laws; Measurement; Physical Quantities and units; SI Unit system; Measurement of small distances; Measurement of larger distances; Significant figures; Theory of errors; Dimensional analysis
Unit 2 : Kinematics	Motion in straight line; Basic concepts of calculus and graph; Speed, velocity; Average speed, Instantaneous velocity, Average velocity; Position-time graph; Velocity-time graph; Relative velocity in 1-Dimension; Accelerated motion; Elementary concepts of vector algebra; Relative velocity in 2-D; Projectile motion; Circular motion
Unit 3 : Laws of Motion	Force; Newton's laws of motion; Law of conservation of linear momentum and its applications; Equilibrium of concurrent forces with Lami's theorem; free body diagram; Friction
Unit 4 : Work, Energy and Power	Work; Work done by a constant force; Work done by a variable force; Energy; Potential Energy and Kinetic energy; Law of conservation of energy; Work-

	Energy theorem; Power, Collision
Unit 5 : Motion of system of particles and rigid body	Centre of mass; Centre of mass of two particles system; Moment of Inertia; Radius of gyration; Theorems of Moment of Inertia; Moment of inertia of ring, disc uniform rod and spherical objects; Dynamics of circular motion; Rotational mechanics; Moment of force; Torque; Angular momentum; Law of conservation of angular momentum
Unit 6 : Gravitation	Gravitation; Kepler's law; Universal law of gravitation; Acceleration due to gravity; Gravitational field; Gravitational potential; Escape speed; Earth satellites; Orbital velocity; Geo stationery and polar satellite; Elementary ideas of Astrophysics
Unit 7 : Properties of Matter	Intermolecular or inter atomic forces; Elasticity; Stress and strain; Hooke's law, Experimental verification; Stress-strain graph; Moduli of elasticity; Poisson's ratio; Fluids; Pressure due to fluid column; Pascal's law and applications; Buoyant force; Archimedes principle; Viscosity; Streamline flow ; Turbulent flow; Terminal velocity; Stokes law and its applications; Surface Tension; Surface energy, relation between S.E and S.T; Angle of contact; Capillarity; Bernoulli's theorem and its applications
Unit 8 : Heat and Thermodynamics	Thermal properties of matter -Heat; Temperature; Change of state; Specific heat capacity; latent heat capacity; calorimetry; Thermal Expansion of solids, liquids and gases, Heat transfer; Laws of heat

	transfer; Newton's law of cooling; Thermodynamics; Zeroth law of thermodynamics; Internal energy; First law of thermodynamics; Quasi static process; Indicator diagrams; Thermodynamic process; Meyer's relation; Work done in Thermodynamic processes; Heat engine; Second law of thermodynamics
Unit 9 : Behavior of Perfect Gas and Kinetic Theory of Gases.	Kinetic theory of gases; Pressure exerted by a gas; Relation between pressure and mean kinetic energy; Average kinetic energy per molecule of a gas; Gas laws; Degrees of freedom; Law of equi-partition of energy; Specific heat of a gas; Mean free path; Brownian motion
Unit 10 : Oscillations	Periodic and oscillatory motion; Simple Harmonic Motion; Displacement, velocity acceleration, time period and frequency of SHM; Angular harmonic motion; Linear simple harmonic oscillator;; Oscillations of a simple pendulum in SHM and laws of simple pendulum; Energy of simple harmonic oscillator Types of oscillations
Unit 11 : Waves	Introduction of wave formation; Characteristics of wave motion; Mechanical wave motion and its types; Terms and definitions used in wave motion; Velocity of waves in different media; Propagation of sound waves; Progressive waves; Reflection of sound waves; Superposition principle; Interference of waves; Formation of beats; Stationary waves; Intensity and loudness; Vibrations of air column;

	Doppler Effect
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STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING
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Subject :Physics

Class : XII

TOPIC	CONTENT
Unit 1 : Electrostatics	Introduction of charges; Coulomb's law; Electric field; Electric dipole; Electrostatic potential; Electrostatic potential energy; Electric flux; Gauss law and its applications; Electrostatic properties of conductors and insulators; Free and bound charges inside the conductor; Dielectrics; Electric polarization; Capacitance and capacitors Parallel plate capacitor with and without dielectrics; Capacitors in parallel and series; Distribution of charges on a conductor and action of points; Lightning arresters; Van de Graff generator

<p>Unit 2 :</p> <p>Current electricity and Heating Effects of Electric Current</p>	<p>Electric current; Ohm's law; Resistance in series and parallel, Color code for carbon resistors; Temperature dependence of resistance; Potential difference and EMF of a cell; Cells in series and in parallel; Kirchoff's laws; Wheatstone bridge; Meter bridge; Potentiometer; Electric energy; electric power; Heating effect of electric current, Joule's law, Thermo electric effect, Seebeck effect; Peltier effect; Thomson effect</p>
<p>Unit 3 :</p> <p>Magnetism and Magnetic Effects of Electric Current</p>	<p>Magnetic effects of current; Biot-Savart law; Ampere circuital law; Lorentz force; Force on a moving charge in a magnetic field; Cyclotron; Force on a current carrying conductor placed in a magnetic field; Torque on a current loop; Moving coil galvanometer; Earth's magnetic field and magnetic elements; Coulomb inverse square law of magnetism; Magnetic dipole; Magnetic induction at a point along the axial line and equatorial line of the bar magnet; Torque acting on a bar magnet in uniform magnetic field; Tangent law and Tangent galvanometer; Magnetic properties; Classification of magnetic materials; Hysteresis</p>
<p>Unit 4 :</p> <p>Electro magnetic induction and Alternating current</p>	<p>Magnetic flux; Electromagnetic induction; Faraday's law; Lenz's law; Flemming's right hand rule; Eddy current; Self induction; Methods of producing induced emf; AC generator; Transformer; Alternating current; AC voltage applied to a resistor; inductor; capacitor; LCR circuit; Q factor; Power in an AC circuit; Power factor; Oscillation in a LC circuit</p>
<p>Unit 5 :</p> <p>Electromagnetic</p>	<p>Displacement current; Electromagnetic waves;</p>

waves	Electromagnetic spectrum (Radio waves-Microwaves-Infrared Waves- Visible light-Ultraviolet rays-X rays-Gamma rays); Types of spectrum; Fraunhofer lines
Unit 6 : Optics	<p>Ray Optics - Reflection; laws of reflection; Spherical mirrors; Mirror formula; Refraction; laws of refraction; Lens makers formula; Magnification power; Total internal reflection; Refraction and dispersion of light through prism</p> <p>Wave optics - Huygen's Principle; Reflection; Refraction of plane waves at a plane surface using wave front; Young's double slit experiment; Diffraction: Diffraction due to single slit; Polarization: Plane polarised light; Brewster's law; Nicol prism; Malus law; Polaroids; Scattering - Rayleigh, Raman scattering; Maser and Laser; Optical instruments, Microscope, Astronomical telescope</p>
Unit 7 : Dual Nature of Radiation and Matter	Dual nature of radiation and matter; Photoelectric effect; Laws of photoelectric emission; Einstein's photoelectric equation; Photo cell and application; Matter waves; Wave nature of Matter; De Broglie equation; Electron microscope; Davisson and Germer experiment; X rays
Unit 8 : Atoms and Nuclei	<p>Atoms - Early atom models; Alpha particle scattering experiments; Rutherford model; Bohr's atom model; Atomic spectra</p> <p>Nuclei - Composition of Nuclei, Size and density of nucleus; Isotopes, isobars and isotones; Mass defect, binding energy; Nuclear forces; Radioactivity; α, β and γ decay; Laws of radioactive decay; Nuclear Fission, fusion</p>

<p>Unit 9 : Semiconductor Devices</p>	<p>Classification of metals, insulators and semiconductors; Types of semiconductors; Diodes; Breakdown mechanism, Zener diode; Light Emitting Diode; Photodiode; Solar cell; Transistors; Transistor configuration; Transistor action; Common emitter; Transistor characteristics; Transistor as an amplifier; Transistor as an oscillator; Digital electronics; Digital and analog signals Integrated chips; Logic gates; Boolean algebra</p>
<p>Unit 10 : Communication systems</p>	<p>Elements of communication system; Band width; Modulation; Antenna; Propagation of electromagnetic waves; Satellite communication; Optical fibre communication; Radar; Internet; Mobile phone; Global Positioning System</p>
<p>Unit 11 : Recent Developments in Physics</p>	<p>Physics as basic building block for science, Engineering and technology; Nanotechnology; Robotics; Physics in biology</p>