

# MHT CET Physics Syllabus

The physics syllabus for the MHT CET exam includes subjects and topics from the 11th and 12th standards. The topics included in the MT CET physics syllabus are given below:

## MHT CET Physics Class 11th Topics

### Measurements

Introduction, Need for measurement, Units for measurement, System of Units, S.I. Units, Fundamental and derived units, Dimensional analysis, Order of magnitude and significant figures, Accuracy and errors in measurement.

### Scalars and Vectors

Addition and subtraction of vectors, Product of vectors.

### Force

Types of forces, General idea of gravitation, electromagnetic and nuclear forces, Law of conservation of momentum, Work done by a variable force. Work energy theorem, Elastic and inelastic collisions in one and two dimensions, Inertial and non-inertial frames, Moment of force, Couple and properties of couple, Centre of mass, Centre of gravity, Conditions of equilibrium of a rigid body.

### Friction in solids and liquids

Origin and nature of frictional forces, Laws of static friction, Laws of kinetic friction, Pressure due to fluid column, Pascal's Law and its applications, Effect of gravity on fluid pressure, Viscosity, Streamline flow, turbulent flow, Viscous force, Newton's formula, Stokes' law, Equation for terminal velocity, Raynold's number, Bernoulli's principle and its applications.

### Refraction of Light

Refraction of monochromatic light, Snell's law, Total internal reflection, Critical angle, Optical fibre, Dispersion of light, Prism formula, Angular dispersion and dispersive power, Rainbow, Scattering of light, Blue colour of sky, Colour of sun at sunrise and sunset. Elementary idea of Raman effect.

### Ray optics

Reflection of light by spherical mirrors, Refraction at single curved surface, Lens maker's equation, Combination of thin lenses in contact, Concept of conjugate foci, Correction of eye defects, Magnifying power of simple microscope, Magnifying power of compound microscope, Magnifying power of telescope, Reflecting telescope - schematic diagram with explanation.

### Magnetic effect of electric current

Oersted's experiment, Biot Savart's law, Right hand rule, Magnetic induction at the centre of circular coil carrying current, Magnetic induction at a point along the axis of a coil carrying current, Fleming's left hand rule, Force between two infinitely long current carrying parallel conductors, Definition of Ampere, Force acting on a conductor carrying current in magnetic field, Torque on a current loop in magnetic field.

### Magnetism

Origin of magnetism due to moving charges, Equivalence between magnetic dipole and circular coil carrying current, Definition of magnetic dipole moment and its unit, Torque acting on a magnet in uniform magnetic induction, Bar magnet as an equivalent solenoid, Magnetic field lines, Magnetic induction due to bar magnet at a point along the axis and at a point along equator, Earth's magnetic field and magnetic elements, Electromagnets and factors affecting their strength.

## **MHT CET Physics Class 12th Topics**

### Circular motion

Angular displacement, Angular velocity and angular acceleration, Relation between linear velocity and angular velocity, Uniform circular motion, Radial acceleration, Centripetal and centrifugal forces, Banking of roads, Vertical circular motion due to earth's gravitation, Equation for velocity and energy at different positions of vertical circular motion. Kinematical equations for circular motion in analogy with linear motion.

### Rotational motion

Definition of M.I., K.E. of rotating body, Rolling motion, Physical significance of M.I., Radius of gyration, Torque, Principle of parallel and perpendicular axes, M.I. of some regular shaped bodies about specific axes, Angular momentum and its conservation.

### Oscillations

Explanation of periodic motion, S.H.M., Differential equation of linear S.H.M. Projection of U.C.M. on any diameter, Phase of S.H.M., K.E. and P.E. in S.H.M., Composition of two S.H.M. 's having the same period and along the same line, Simple pendulum, Damped S.H.M.

### Gravitation

Newton's law of gravitation, Projection of satellite, Periodic time, Statement of Kepler's laws of motion, Binding energy and escape velocity of a satellite, Weightlessness condition in orbit, Variation of 'g' due to altitude, latitude, depth and motion, Communication satellite and its uses

### Elasticity

General explanation of elastic property, Plasticity, Deformation, Definition of stress and strain, Hooke's law, Poisson's ratio, Elastic energy, Elastic constants and their relation, Determination of 'Y', Behaviour of metal wire under increasing load, Applications of elastic behaviour of materials.

### Electrostatics

Gauss' theorem proof and applications, Mechanical force on unit area of a charged conductor, Energy density of a medium, Dielectrics and electric polarisation, Concept of condenser, Capacity of parallel plate condenser, Effect of dielectric on capacity, Energy of charged condenser, Condensers in series and parallel, van-deGraaff generator

### Wave Motion

Simple harmonic progressive waves, Reflection of transverse and longitudinal waves, Change of phase, Superposition of waves, Formation of beats, Doppler effect in sound.

### Magnetism

Circular current loop as a magnetic dipole, Magnetic dipole moment of revolving electron, Magnetisation and magnetic intensity, Diamagnetism, Para magnetism, Ferromagnetism on the basis of domain theory, Curie temperature.

### Surface Tension

Surface tension on the basis of molecular theory, Surface energy, Surface tension, Angle of contact, Capillarity and capillary action, Effect of impurity and temperature on surface tension

### Wave Theory of Light

Wave theory of light, Huygens' Principle, Construction of plane and spherical wave front, Wave front and wave normal, Reflection at plane surface, Refraction at plane surface, Polarisation, Polaroids, Plane polarised light, Brewster's law, Doppler effect in light

### Stationary Waves

Study of vibrations in a finite medium, Formation of stationary waves on string, Study of vibrations of air columns, Free and Forced vibrations, Resonance.

### Kinetic Theory of Gases and Radiation

Concept of an ideal gas, Assumptions of kinetic theory, Mean free path, Derivation for pressure of a gas, Degrees of freedom, Derivation of Boyle's law, Thermodynamics- Thermal equilibrium and definition of temperature, 1st law of thermodynamics, 2nd law of thermodynamics, Heat engines and refrigerators, Qualitative idea of black body radiation, Wein's displacement law, Greenhouse effect, Stefan's law, Maxwell distribution, Law of equipartition of energy and application to Specific heat capacities of gases.

### Interference and Diffraction

Interference of light, Conditions for producing steady interference pattern, Young's experiment, Analytical treatment of interference bands, Measurement of wavelength by biprism experiment, Diffraction due to single slit, Rayleigh's criterion, Resolving power of a microscope and telescope, Difference between interference and diffraction.

### Current Electricity

Kirchhoff's law, Wheatstone's bridge, Meter bridge, Potentiometer

### Magnetic Effects of Electric Current

Ampere's law and its applications, moving coil galvanometer, Ammeter, Voltmeter, Sensitivity of moving coil galvanometer, Cyclotron.

### Electromagnetic Inductions

Laws of electromagnetic induction, proof of,  $\epsilon = -d\Phi/dt$  Eddy currents, Self-induction and mutual induction, Need for displacement current, Transformer, Coil rotating in uniform magnetic induction, Alternating currents, Reactance and impedance, LC oscillations 154 (qualitative treatment only) Power in a.c circuit with resistance, inductance and capacitance, Resonant circuit, Wattless current, AC generator.

### Electrons and Photons

Photoelectric effect, Hertz and Lenard's observations, Einstein's equation, Particle nature of light

## Atoms, Molecules and Nuclei

Alpha particle scattering experiment, Rutherford's model of atom. Bohr's model, Hydrogen spectrum, Composition and size of nucleus, Radioactivity, Decay law, mass energy relation, mass defect, B.E. per nucleon and its variation with mass number, nuclear fission and fusion, de Broglie hypothesis, Matter waves – wave nature of particles, Wavelength of an electron, Davisson and Germer experiment, Continuous and characteristics X-rays.

## Semiconductors

Energy bands in solids, Intrinsic and extrinsic semiconductors, P-type and N Type semiconductor, P-N junction diode, I-V characteristics in forward and reverse bias, Rectifiers, Zener diode as a voltage regulator, Photodiode, Solar cell, I-V characteristics of LED, Transistor action and its characteristics, Transistor as an amplifier (CE mode), Transistor as a switch, Oscillators and Logic gates (OR, AND, NOT, NAND, NOR)

## Communication Systems

Elements of communication system, bandwidth of signals, bandwidth of transmission medium, need for modulation, Production and detection of an amplitude modulated wave, space communication, Propagation of electromagnetic waves in atmosphere.