MATRIX

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NEET & Medical | NEET UG

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Physics Formulas for NEET UG Exam 2026: Formula Sheet PDF Download Free

1. Mechanics

Mechanics is one of the important topics in NEET Physics with approximately 20-25% weightage in the final exam. Mechanics is a fundamental element of Physics and primarily deals with the motion of objects and the forces acting on them. The strategy to master Mechanics revolves around an in-depth understanding of vectors, motion, and energy. Below are some of the important formulas under Mechanics:

1.1 Vectors

Vectors in NEET Physics are an important topic to clearly understand magnitude and direction in Physics problems, especially in Mechanics.

$$Notation: \vec{a} = a_x\,\hat{i} + a_y\,\hat{j} + a_z\hat{k}$$

$$Magnitude: a = |\vec{a}| = \sqrt{a_x^2 + a_y^2 + a_z^2}$$

$$Dot\ Product: \vec{a}\cdot\vec{b} = a_xb_x + a_yb_y + a_zb_z = ab\cos\theta$$

$$Cross\ Product: \vec{a}\times\vec{b} = (a_yb_z - a_zb_y)\,\hat{i} + (a_zb_x - a_xb_z)\,\hat{j} + (a_xb_y - a_yb_x)\,\hat{k}$$

1.2 Kinematics

The focus of Kinematics is on the motion of objects without focusing on the force involved in it, which effectively forms the basis for various Physics formulas.

$$Displacement: s = ut + \frac{1}{2}at^2$$

$$\text{Average and Instantaneous Velocity and Acceleration}: \vec{v}_{\text{av}} = \frac{\Delta \vec{r}}{\Delta t},$$

$$\vec{v}_{\text{inst}} = \frac{d\vec{r}}{dt}$$

$$\vec{a}_{\text{av}} = \frac{\Delta \vec{v}}{\Delta t},$$

$$\vec{a}_{\text{inst}} = \frac{d\vec{v}}{dt}$$

$$Velocity: v = u + at$$

$$Acceleration: a = \frac{v-u}{t}$$

$$Power: P_{\text{av}} = \frac{\Delta W}{\Delta t},$$

$$P_{\text{inst}} = \vec{F} \cdot \vec{v}$$

$$\text{Equation of motion (for uniformly accelerated motion)}: v^2 = u^2 + 2as$$

$$\text{Mechanical energy: E} = \text{U} + \text{K. Conserved if forces are conservative in nature.}$$

1.3 Newton's Laws and Friction

The Law of Newton clearly explains the relationship between the acting forces on an object with their motion, while Friction is a resistive force that opposes motion.

$$\text{Newton's first law: Inertial frame}$$

$$\text{Newton's Second Law: F} = \text{ma}$$

$$\text{Newton's third law:} \vec{F}_{AB} = -\vec{F}_{BA}$$

$$\text{Frictional Force}: F_{\text{friction}} = \mu N : (\mu)\text{is the coefficient of friction, and (N) is the normal force.}$$

1.4 Work, Power, and Energy

All three are important concepts for Physics formulas that effectively describe the conversion and transfer of energy.

$$\text{Work: } W = \vec{F} \cdot \vec{S} = FS\cos\theta$$

$$\text{Power: } P = \frac{W}{t}$$

$$\text{Kinetic Energy: } KE = \frac{1}{2}mv^2$$

$$\text{Potential Energy: } PE = mgh$$

1.5 Centre of Mass and Collision

The centre of Mass and Collision help in creating an understanding of the centre of mass and how objects collide is crucial in Mechanics.

$$\text{Centre of Mass : } x_{\text{cm}} = \frac{\sum m_i x_i}{\sum m_i},$$

$$\text{Elastic Collision : } e = -\frac{v_1{}' - v_2{}'}{v_1 - v_2}$$

1.6 Rigid Body Dynamics

Rigid Body Dynamics provides a brief overview of the rotation and motion of solid bodies.

$$\text{Torque: } \tau = \vec{r} \cdot \vec{F}$$

$$\text{Moment of Inertia: } I = \sum m_i r_i^2$$

$$\text{Angular Momentum: } L = I\,\omega$$

$$\text{Orbital Velocity of Satellite: } v_0 = \sqrt{\frac{GM}{r}}$$

1.7 Gravitation

Gravitation deals with the attractive force between masses.

$$\text{Gravitational Force : } F = G\frac{m_1 m_2}{r^2}$$

$$\text{Gravitational Potential Energy : } U = -\frac{GMm}{r}$$

$$\text{Escape Velocity: } v_e = \sqrt{\frac{2GM}{r}}$$

$$\text{Gravitational Acceleration: } g = \frac{GM}{R^2}$$

1.8 Simple Harmonic Motion (SHM)

In SHM (Simple Harmonic Motion) motion, the restoring force is directly proportional to displacement.

$$\text{Displacement in SHM: } x(t) = A\cos(\omega t + \phi)$$

$$\text{Angular Frequency: } \omega = \sqrt{\frac{k}{m}}$$

$$\text{Time Period: } T = 2\pi\sqrt{\frac{m}{k}}$$

$$\text{Acceleration: } a = \frac{d^2x}{dt^2} = -\frac{k}{m}x = -\omega^2 x$$

$$\text{Velocity: } v = \frac{dx}{dt} = -A\omega\sin(\omega t + \phi) = \pm\omega\sqrt{A^2 - x^2}$$

1.9 Properties of Matter

This topic involves the study of the physical properties of materials.

$$\text{Young's Modulus : } \frac{\text{Stress}}{\text{Strain}} = \frac{F/A}{\Delta L/L}$$

$$\text{Bulk Modulus: } -\frac{V\,\Delta P}{\Delta V}$$

$$\text{Modulus of Rigidity : } \eta = \frac{F/A}{\Delta l/l}$$

$$\text{Compressibility : } \frac{1}{B} = -\frac{1}{V}\frac{dV}{dP}$$

$$\text{Surface Tension : } \frac{F}{l}$$

$$\text{Surface Energy: } U = SA$$

$$\text{Buoyant Force : } \rho V g = \text{Weight of displaced liquid}$$

$$\text{Torricelli's Theorem: } v_{\text{efflux}} = \sqrt{2gh}$$

2. Waves

Waves in NEET Physics are considered oscillations that shift energy from one end to another through a medium. This type of fundamental concept in NEET Physics is applicable in various domains. For example, ripples on a pond to the propagation of light and sound.

2.1 Wave Motion

Wave motion describes how disturbances travel through a medium.

$$\text{General equation of wave : } \frac{\partial^2 y}{\partial x^2} = \frac{1}{v^2}\frac{\partial^2 y}{\partial t^2}$$

$$\text{Progressive wave travelling with speed : } y = f\left(t - \frac{x}{v}\right), \quad \text{wave traveling in } +x \text{ direction}$$

$$y = f\left(t + \frac{x}{v}\right), \quad \text{wave traveling in } -x \text{ direction}$$

2.2 Waves on a String

Waves in a stretched string are controlled by tension and mass per unit length.

$$\text{Wave Speed on a String : } v = f\lambda, \text{where (T) is the tension and} (\mu) \text{is the mass per unit length.}$$

$$\text{Transmitted Power : } P_{\text{av}} = 2\pi^2 \mu v A^2 \nu^2$$

$$\text{Interference:} y_1 = A_1 \sin(kx - \omega t), \quad y_2 = A_2 \sin(kx - \omega t + \delta)$$

$$y = y_1 + y_2 = A \sin(kx - \omega t + \phi)$$

$$A = \sqrt{A_1^2 + A_2^2 + 2A_1 A_2 \cos\delta}$$

$$\tan\phi = \frac{A_2 \sin\delta}{A_1 + A_2 \cos\delta}$$

$$\delta = 2n\pi \text{ (constructive)}, \quad \delta = (2n+1)\pi \text{ (destructive)}$$

2.3 Sound Waves

Sound waves are longitudinal waves that travel with the support of a medium.

$$\text{Speed of Sound: In a liquid: } v_{\text{liquid}} = \sqrt{\frac{B}{\rho}}$$

$$\text{In a solid: } v_{\text{solid}} = \sqrt{\frac{Y}{\rho}}$$

$$\text{In a gas: } v_{\text{gas}} = \sqrt{\frac{\gamma P}{\rho}}$$

$$Intensity : I = 2\pi^2 \frac{Bv}{v_s^2} \nu^2 = \frac{p_0^2 v}{2B} = \frac{p_0^2}{2\rho v}$$

$$\text{Standing longitudinal waves : } p_1 = p_0 \sin\omega\left(t - \frac{x}{v}\right),$$

$$p_2 = p_0 \sin\omega\left(t + \frac{x}{v}\right)$$

$$p = p_1 + p_2 = 2p_0 \cos kx \ \sin\omega t$$

2.4 Light Waves

Light is an electromagnetic wave.

$$\text{Speed of Light}: c = 3 \times 10^8 \text{ m/s}$$

$$\text{Plane Wave}: E = E_0 \sin\omega\left(t - \frac{x}{v}\right), \quad I = I_0$$

$$\text{Spherical Wave}: E = \frac{aE_0}{r}\sin\omega\left(t - \frac{r}{v}\right),$$

$$I = \frac{I_0}{r^2}$$

3. Optics

Optics deals with the study of light and its interactions with matter.

3.1 Reflection of Light

Reflection is the bouncing back of light from a surface.

$$\text{Law of Reflection}: \theta_i = \theta_r$$

3.2 Refraction of Light

Refraction is the bending of light as it passes from one medium to another.

$$\text{Refractive index:} \mu = \frac{\text{speed of light in vacuum}}{\text{speed of light in medium}} = \frac{c}{v}$$

$$\text{Snell's Law}: \frac{\sin i}{\sin r} = \frac{\mu_2}{\mu_1}$$

$$\text{Critical Angle}: \theta_c = \sin^{-1}\left(\frac{1}{\mu}\right)$$

3.3 Optical Instruments

The primary examples of Optical instruments are microscopes and telescopes that use lenses to magnify objects.

$$\text{Lens Formula}: \frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

3.4 Dispersion

Dispersion is directly related to the separation of light into various component colours.

$$\text{Refractive Index for Dispersion}: n(\lambda) = \frac{c}{v(\lambda)}$$

$$\text{Cauchy's equation}: \mu = \mu_0 + \frac{A}{\lambda^2}, \quad A > 0$$

$$\text{Dispersive Power}: \omega = \frac{\mu_v - \mu_r}{\mu_y - 1} \approx \frac{\theta}{\delta y}$$

4.2 Kinetic Theory of Gases

The Kinetic theory of gases explains the behaviour of gases in terms of particle motion.

$$\text{Ideal Gas Law}: M = mN_A, \quad k = \frac{R}{N_A}$$

$$\text{RMS Speed}: v_{\text{rms}} = \sqrt{\frac{3kT}{m}} = \sqrt{\frac{3RT}{M}}$$

$$\text{Average Speed}: \bar{v} = \sqrt{\frac{8kT}{\pi m}} = \sqrt{\frac{8RT}{\pi M}}$$

4.3 Specific Heat

This term is related to the quantity of heat necessary to increase the temperature of a unit mass by a degree.

$$\text{Specific Heat Formula}: s = \frac{Q}{m\Delta T}$$

$$\text{Latent Heat}: L = \frac{Q}{m}$$

$$\text{Specific Heat at Constant Volume} : C_v = \left.\frac{\Delta Q}{n\,\Delta T}\right|_V$$

$$\text{Specific heat at Constant Pressure} : C_p = \left.\frac{\Delta Q}{n\,\Delta T}\right|_p$$

4.4 Thermodynamic Processes

A thermodynamic process includes energy transformations in systems.

$$\text{First Law of Thermodynamics} : \Delta Q = \Delta U + \Delta W$$

$$\text{Work Done by Gas} : \Delta W = p\Delta V, \quad W = \int_{V_1}^{V_2} p\,dV$$

$$\text{Isothermal} : W_{\text{isothermal}} = nRT \ln \frac{V_2}{V_1}$$

$$\text{Isobaric: } W_{\text{isobaric}} = p(V_2 - V_1)$$

$$\text{Adiabatic: } W_{\text{adiabatic}} = \frac{p_1 V_1 - p_2 V_2}{\gamma - 1}$$

$$\text{Isochoric: } W_{\text{isochoric}} = 0$$

5. Electricity and Magnetism

5.1 Electrostatics

Electrostatics mainly examines stationary electric charges.

$$\text{Coulomb's Law} : \vec{F} = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}\,\hat{r}$$

$$\text{Electrostatic Energy} : U = -\frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r}$$

$$\text{Electric Field} : \vec{E}(\vec{r}) = \frac{1}{4\pi}$$

5.2. Gauss's Law

Gauss's law offers assistance in analysing electric fields, especially in cases of high symmetry.

$$\text{Gauss's Law}: \oint \vec{E} \cdot d\vec{S} = \frac{q_{\text{in}}}{\varepsilon_0}$$

$$\text{Electric Flux}: \phi = \oint \vec{E} \cdot d\vec{S}$$

5.3. Capacitors

Capacitors are an independent device that stores electrical energy.

$$\text{Capacitance}: C = \frac{q}{V}$$

$$\text{Spherical capacitor}: C = 4\pi\varepsilon_0 \frac{r_1 r_2}{r_2 - r_1}$$

$$\text{Cylindrical capacitor}: C = \frac{2\pi\varepsilon_0 l}{\ln(r_2/r_1)}$$

$$\text{Parallel Plate Capacitor}: C = \frac{\varepsilon_0 A}{d}$$

5.4. Current Electricity

Current electricity manages the overall flow of charge through conductors.

$$\text{Ohm's Law}: V = iR$$

$$\text{Power in Electrical Circuits}: P = I^2 R = \frac{V^2}{R}$$

$$\text{Current Density}: \vec{j} = \frac{i}{A} = \sigma \vec{E}$$

5.5. Magnetism

Magnetism conducts an in-depth study of the force and field produced by moving charges.

$$\text{Magnetic Force on a Moving Charge} : F = qvB\sin\theta$$

q is consider charge, B is the magnetic field, is the velocity, and is the angle between velocity and magnetic field.

5.6 Electromagnetic Induction

Electromagnetic induction provides a brief description of how a changing magnetic field induces an electric current.

$$\text{Faraday's Law of Induction} : \mathcal{E} = -\frac{d\Phi}{dt}$$

$$\text{Magnetic Flux} : \Phi = \oint \vec{B} \cdot d\vec{S}$$

6. Modern Physics

Modern Physics manages the phenomena of the sub-atomic and atomic levels, which is important to understand the natural behaviour of waves and particles.

6.1. Photoelectric Effect

This field is responsible for controlling the emission of electrons from a material when exposed to light.

$$\text{Einstein's Equation for Photoelectric Effect} : E_{\text{photon}} = h\nu = \phi + K_{\max}$$

$$\text{Proton's Energy} : E = h\nu = \frac{hc}{\lambda}$$

$$\text{Photon's momentum} : p = \frac{h}{\lambda} = \frac{E}{c}$$

6.2. The Atom

An atom's energy level and structure are compulsory to understand atomic spectra.

$$\text{Bohr's Energy Formula} : E_n = -\frac{13.6}{n^2}\ \text{eV}$$

$$\text{Radius of the nth Bohr's orbit} : r_n = \frac{\varepsilon_0 h^2 n^2}{\pi m Z e^2},$$

$$r_n = \frac{n^2 a_0}{Z},$$

$$a_0 = 0.529\text{Å}$$

6.3 Vacuum Tubes and Semiconductors

An essential device in electronics, which is mainly used in amplifiers, oscillators, and other applications.

$$\text{Energy Band Gap in Semiconductors} : E_g = E_c - E_v$$

$$\text{Plate resistance of a Triode} : r_p = \frac{\Delta V_p}{\Delta i_p}, \quad \Delta V_g = 0$$

$$\text{Current in A Transistor} : I_E = I_B + I_C$$

6.4 The Nucleus

The Nucleus mainly combines the study of atomic nuclei and their properties.

$$\text{Nuclear Binding Energy} : E = \Delta m c^2$$

Where is the mass defect, and is the speed of light.

$$\text{Nuclear Radius} : R = R_0 A^{1/3}, \quad R_0 \approx 1.1 \times 10^{-15}\ \text{m}$$

$$\text{Decay Rate} : \frac{dN}{dt} = -\lambda N$$

Conclusion

In conclusion, a strong and in-depth knowledge of NEET Physics formulas ensures success in the final NEET UG 2026 exam. To strengthen the NEET Physics formulas, you should understand the applications and derivations behind formulas to solve complex/difficult questions with confidence. Matric Academy is currently identified as the best NEET coaching institute that not only memorises NEET Physics formulas but also creates their deeper significance and practical applications. You should also practice these formulas by practising with Matrix-