

LAST MINUTE REVISION FOR GRADE 10

PHYSICS BOARD EXAM 2025-26

SET 1: Definitions / diagrams / numerical formulae / give reasons / differences between / factors affecting.

- **DEFINITIONS:**

- **Moment of force:** The **rotational effect of force** exerted on a beam that is pivoted about a point called fulcrum, pivot or hinge is called moment of force. Its SI unit is newton meter.

Mathematically,

Moment of force = force x perpendicular distance between line of action of force and fulcrum

- **Couple:** Two equal opposite parallel forces separated by a distance constitute a couple. Its SI unit is newton meter.

Mathematically,

Moment of couple = magnitude of one of the equal forces and the distance between both the forces [couple arm]

- **Law of moments:** For a beam to be in **rotational equilibrium**, the **algebraic** sum of all clockwise moments is equal to the **algebraic** sum of all anticlockwise moments **about the same fulcrum**.

Mathematically,

Total clockwise moments = Total anticlockwise moments

- **Centre of gravity:** The **imaginary point** at which the algebraic sum of particles constituting the body is assumed to be concentrated.

Note: Lighter the object higher the position of centre of gravity from the base

Heavier the object lower is the position of centre of gravity from the base.

- **Centripetal force:** When a body moves in a circular path the **centre seeking force** is called centripetal force and is a real force.
- **Centrifugal force:** When a body moves in a circular path the **outwards seeking force** away from centre is called centrifugal force and is a pseudo force.
- **Clockwise moments:** Moment of force created either by force acting towards the **right of fulcrum acting downwards** OR force acting towards the **left of fulcrum acting upwards** produces a clockwise moment. It is considered to produce a **negative moment**.
- **Anticlockwise moments:** Moment of force created either by force acting towards the **left of fulcrum acting downwards** OR force acting

towards the **right of fulcrum acting upwards** produces an anticlockwise moment. It is considered to produce a **positive moment**.

- **Work:** Work is said to be done when a force or component of force displaces the body in the direction of force applied. Its S.I unit is joule. **Mathematically,**

$$\text{Work done} = F \cos \theta \times S$$

- **Negative work:** Work done is negative when force or component of force displaces the body against the direction of force applied. In this case angle between force and displacement is 180° . It is a scalar quantity hence **minimum work is not negative work but zero work**.
- **Zero work:** Work done is said to be zero when there is **no net displacement** of the body or angle between force and displacement is 90° such that **$\cos \theta = \cos 90^\circ = \text{zero}$** .
- **Power:** Rate at which **work is done per unit time** is called power. Its S.I unit is watt.
- **1 watt:** The power generated is said to be 1 watt when **1 joule of work is performed in 1 second**.
- **Work energy theorem:** Work done by a body is equal to **change in kinetic energy** OR also equal to **change in gravitational potential energy**.
- **Law of conservation of energy:** Energy can neither be created nor be destroyed, it only can be transformed from one form to another such that **total energy of an isolated system is constant**.
- **Mechanical advantage:** The ratio of load to effort is called the mechanical advantage. It being a **pure ratio is a unit less quantity**.
- **Velocity ratio:** The ratio of **velocity** of effort to the **velocity** of load is called Velocity ratio. It being a pure ratio is a **unit less quantity** also defined as ratio of **displacement of effort** to **displacement of load** as both displacements occur in the same time interval hence called as displacement ratio. Again, it being a pure ratio is a **unitless quantity**.
- **Efficiency:** The ratio of work **output to work input** or the ratio of **power output to power input** is called the efficiency of the machine. Generally, efficiency is expressed as percentage.
- **Principle of ideal machine:** Work output = work input or power output = power input. In this case efficiency is 100%
- **Principle of practical machine:** Work output = work input + work done in overcoming frictional resistance + work done in overcoming weight of the machine parts. In this case efficiency is less than 100%.
- **Law of levers:** For a lever to be in equilibrium, applying the law of moments, **Load x load arm = Effort x effort arm** about the same fulcrum.

- **Refraction:** When a ray of light is **incident obliquely** on an optical boundary that separates two **optical media**, it **changes its original path**. Such a phenomenon is called as refraction of light.
- **Snell's law:** The ratio of **sine of angle of incidence** to **sine of angle of refraction for a given pair of optical media** is a constant and this constant is called the **refractive index of second medium with respect to first**.
- **Refractive index** is also defined as **the ratio of velocity of light in air to velocity of light in medium**. [Absolute refractive index]
- **Refractive index** also is defined as the **ratio of real depth to apparent depth**. It being a pure ratio is a unit less quantity.
- **Lateral displacement:** The **perpendicular shift** between the original incident ray produced and the emergent ray after refracting through an **optical glass slab** is called lateral displacement.
- **Critical angle:** It is the angle of incidence in **the optically denser medium** for which **the corresponding angle of refraction** in the rarer medium is **90°** is called critical angle.
- **Total internal reflection:** The phenomenon in which the ray of light while travelling from optically denser medium to optically rarer medium at **an angle greater than critical angle** reflects into the same optically denser medium is called Total internal reflection.
- **Angular deviation:** The angle formed between the **original incident ray produced and the emergent ray after refracting through an optical glass prism** is called angular deviation.
- **Power of lens:** The **deviation of a parallel beam of light when passed through a spherical lens** is called as power of lens. It is also defined as the reciprocal of focal length expressed in meter.
- **Magnification:** The **ratio of size of image to size of object when refracted through a spherical lens** is called as its magnification. Also defined as **ratio of image distance to object distance**. It being a pure ratio is a unitless quantity.
- **Dispersion:** The phenomenon in which **a polychromatic ray of light** splits up into its constituent colours when **passed through a glass prism** is called a dispersion of light.
- **Spectrum:** **The band of colours obtained on a screen after dispersing** through an optical glass prism is called as spectrum.
- **Scattering:** The phenomenon of absorbing and re emission of light by molecules of atmosphere is called as scattering.

Mathematically,

Scattering is inversely proportional to [wavelength]⁴

- **Echo:** The phenomenon of **repetition of sound heard after reflection from a solid rigid non-absorbing surface after the original sound ceases** is called as an echo.
- **Free vibrations:** The vibrations which take place under the absence of an external periodic force such that the **body starts vibrating with constant amplitude and frequency** is called as free or natural vibrations. These vibrations **occur only in vacuum** hence are considered **only as theoretical in reference to sound** as a wave.
- **Damped vibrations:** When an external periodic force acts on a body the body **starts vibrating with continuously decreasing amplitude due to the presence of damping forces** such as air resistance till it finally ceases.
- **Resonance or sympathetic vibrations:** It is a **special case of forced vibrations** and is said to occur when the frequency of forced vibrations is either **equal to or an integral multiple of frequency of external periodic force** such that the body starts vibrating **with maximum amplitude producing a loud sound**.
- **Law of vibrating strings:** When a string is stretched between two fixed points, **the frequency of emission is inversely proportional to the length of the string, directly proportional to square root of tension in the string and inversely proportional to the square root of linear density of the string**.
- **Loudness or Intensity:** The amount of **sound energy emitted normal to the surface per unit area** is called loudness. Loudness is a comparable and qualitative aspect hence does not have any unit however when measured it is **intensity whose unit is microwatt-m⁻² or phon**.
- **Quality or Timbre:** When **same note of musical sound** is played on **different instruments** different sounds are heard such a characteristic is called quality and when these different sounds are represented in **waveform notation**, we obtain timbre.
- **Current:** **The rate of flow of electric charge through a uniform cross section of a conductor per unit time** is called as current.
- **Ohm's law:** Physical conditions of a conductor like temperature remaining constant, **current flowing through the conductor is directly proportional to the potential difference** between the two ends of a conductor.

Mathematically,

$$\text{Voltage} = \text{current} \times \text{resistance}$$

- **Ohmic conductors:** The substances **which obey** the Ohm's law are called ohmic conductors. All metallic substances are examples of ohmic conductors.
- **Non ohmic conductors:** The substances **which do not obey** the Ohm's law are called as non-ohmic conductors. Semi-conductors such as diode, triode pentodes are examples of non ohmic conductors.
- **Electromotive force:** The potential difference between the two ends of a **cell when in an open circuit** is called emf of a cell. Its SI unit is volt
- **Terminal voltage:** The potential difference between the two terminals of a **cell when in closed circuit** is called the terminal voltage
- **Internal resistance:** The **resistance offered by the electrolyte to the flow of charges to complete the internal circuit inside the cell** is called internal resistance of cell. It is always connected in series with the external circuit.
- **1 kilowatt hour** is the amount of electrical energy consumed **when 1 kilowatt power is spent in one hour.**
- **Fuse:** It is a **make and break arrangement** in an electric circuit which is always connected in the live / line / phase wire to prevent the hazards of getting fatal shocks.
- **Earthing:** It is the process of **connecting the metallic body of an appliance to earth by means of a copper wire deeply buried inside earth** to carry the excessive charges to earth.
- **Thermal capacity:** The amount of heat required to raise the temperature **of entire mass of a substance through 1 kelvin** is called the thermal capacity. Its SI unit is JK⁻¹
- **Specific heat capacity:** The amount of heat required to raise the temperature **of unit mass of a substance by 1K** is called as specific heat capacity. Its SI unit is Jkg⁻¹K⁻¹
- **Principle of calorimetry:** When two bodies **are in thermal contact** heat lost by hot body is equal to heat gained by cold body provided no heat is lost to the surroundings.
- **Latent heat:** **The hidden form of energy** that is utilized in transforming one physical state of matter to another **without further rise or fall in temperature** is called Latent heat.
- **Specific latent heat of fusion of ice:** The amount of heat required to **change unit mass of ice to water at its melting point without further rise or fall in temperature** is called as Specific latent heat of fusion of ice.
- **Radioactivity:** It is a nuclear phenomenon which occurs due to the **instability of the nucleus on account of it being a heavy nucleus**

i.e., atomic number greater than 82... [natural radioactivity] or if the N/P ratio exceeds 1.5.... [artificial radioactivity]

● **IMPORTANT DIAGRAMS:**

- Block and tackle pulley system for 3,4 and 5
- Coin appears to be raised while dipped in water
- Stick appears to be bend when dipped in water
- Diamond appears to sparkle even in dark
- Twinkling of stars
- Optical fibre
- Formation of mirage
- Isosceles reflecting prism diagrams along with equiangular prisms
- Convex lens ray diagram for object placed between F and 2F and object placed between F and O
- Concave lens diagram for object placed between F and 2F
- Ray diagram for obtaining focal length by auxiliary plane mirror method
- Ray diagram for minimum deviation position along with graph.
- Ray diagram for newton's bi prism experiment.
- Plot of displacement v/s time for free or natural vibrations.
- Plot of displacement v/s time for damped vibrations.
- Diagram for fuse
- Diagram for plug and socket
- Diagram of dual control switch.
- Diagram of magnetic lines of force for straight current carrying conductor
- Diagram for magnetic lines of force for closed circular loop
- Diagram for deflection in galvanometer for motion of magnet inside and outside the coil.
- Schematic diagram for step up transformer
- Schematic diagram for step down transformer.
- Diagram of DC motor
- Diagram of AC dynamo.
- Diagram for a copper calorimeter
- Diagram for effect of electric field on radioactive disintegration
- Diagram for effect of magnetic field doing inside and outside the plane of paper on radioactive disintegration.

- **IMPORTANT FORMULAE:**

- Moment of force = force x perpendicular distance
- Moment of couple = one of the force x couple arm distance
- work done = force x displacement
- work done = $m \times g \times h$
- work done = $F \cos \theta \cdot S$
- work done = $\frac{1}{2} mv^2 - \frac{1}{2} mu^2$
- work done = $mgh_2 - mgh_1$
- Power = work done / time
- Power = Force x velocity
- Kinetic energy = $\frac{1}{2} mv^2$
- Potential energy = mgh
- Heat energy = mass x SHC x change in temperature.
- Electrical energy = Power x time
- Mechanical advantage of lever = Effort arm / load arm = Load / Effort
- Velocity ratio for lever = displacement of effort / displacement of load
- Mechanical advantage for pulley = load / effort
- Velocity ratio for block and tackle system = Number of pulleys
- Efficiency = power output / power input
- Efficiency = work output / work input
- % Efficiency = [Mechanical advantage / Velocity ratio] x 100
- Refractive index = Real depth / Apparent depth
- Refractive index = Real depth / [Real depth - Shift]
- Refractive index = $1 / \sin C$ C is critical angle
- Refractive index = velocity of light in air / velocity of light in medium
- Power of lens in diopter = $1 / \text{focal length [m]} = 100 / \text{focal length [cm]}$
- Lens formula: $1/f = 1/v - 1/u$
f is focal length, v is image distance, u is object distance
- Magnification = $-v / u = \text{height of image} / \text{height of object}$
- Intensity \propto [Amplitude]²
- For an echo to occur,
Wave velocity = $2 [\text{distance}] / \text{time}$
= Total distance travelled / time taken
- $V = I.R$ Ohm's law
- $1/R_p = 1/R_1 + 1/R_2$
- $R_s = R_1 + R_2$
- $I_1 = I.R_2 / R_1 + R_2$
- $\text{Emf} = I [R + r]$

- Electrical work done = $V.I.t = I^2.R.t = V^2.t/R$
- Electrical power = $V.I = I^2.R = V^2/R$
- Electrical energy consumed = Power [W] x Time [hr.] x no. of days / 1000
- Cost of electricity consumed = Electrical energy consumed x Rate
- When α is eliminated, the atomic number reduces by 2 and atomic mass number reduces by 4
- When β is eliminated the atomic number increases by 1 and atomic mass number remains the same
- When γ radiations are emitted no change in atomic number and atomic mass number.
- Amount of heat = mass x specific heat capacity x temperature difference
- Amount of heat = Thermal capacity x difference in temperature
- Thermal capacity = Mass x Specific heat capacity
- Heat lost by hot water = heat gained by cold water
 $\text{mass} \times \text{SHC} \times \Theta_F = \text{mass} \times \text{SHC} \times \Theta_R$
- Heat lost by hot water = heat gained by cold water
+ heat gained by copper calorimeter
 $\text{mass} \times \text{SHC} \times \Theta_{F[\text{water}]} = \text{mass} \times \text{SHC} \times \Theta_{R[\text{water}]} + \text{mass} \times \text{SHC} \times \Theta_{R[\text{Cu Cal}]}$
- Amount of heat absorbed or evolved during change of state = mass x latent heat.
- **IMPORTANT GIVE REASONS:**
- Efficiency of practical machine is less than 100%
- Coin appears to be raised when dipped in water
- Stick appears to be bent when dipped in water
- Stars twinkle in the night
- Diamond sparkle in the dark
- Lower surface of water appears to be silvery
- Crack in a window pane appears to be silvery
- Thicker the glass slab more is the lateral displacement.
- Loud sound is heard during acoustic resonance
- Musical string instruments are provided with hollow sound box.
- Musical stringed instruments have strings of varying thickness
- Larger sound is heard in case of church bells rather than smaller bells.
- Soldiers are asked to break their footsteps while crossing a suspension bridge
- Rear view mirror of a motor bike starts vibrating violently when driven at a particular speed
- Different sounds are heard when a bucket of water is placed under a tap of flowing water.

- A loud and clear sound is heard when the radio is turned on for a particular frequency.
- Fuse is always connected in live wire
- Earthing is connected to metal body of an appliance
- Earth pin is longer and thicker than live and neutral pin
- One should not touch any electrical fixture with wet hands
- It is advisable to use electrical wiring in ring system rather than tree.
- Plugs and sockets of different ratings can be used in parallel connection
- Water is used as an effective coolant in car radiators
- Hot water bottles are used for fomentation during muscular pains
- Water is sprinkled on the farm during winter in severe cold countries
- Soft drinks are more effectively cooled by ice at 0°C rather than water at 0°C
- After a hailstorm the temperature of the surroundings is pleasant
- No chemical change affects radioactivity

- **IMPORTANT DIFFERENCES:**

- Centripetal force and Centrifugal force
- Positive work and Negative work
- Work and Power
- Class I and Class II lever
- Class II and Class III lever
- Class III and Class I lever
- Single fixed pulley and single movable pulley
- Lateral displacement and angular deviation
- Reflection at plane surfaces and total internal reflection
- Spectrum and Dispersion
- Pure and impure spectrum
- Scattering and refraction
- Ultraviolet rays and Infra-red rays
- Forced vibrations and Resonance
- Free vibrations and Damped Vibrations
- Loudness and Intensity
- Resistance and specific resistance
- Ohmic conductors and non Ohmic conductors
- Electromotive force and Terminal voltage
- Resistance in series and resistance in parallel
- Electrical work done and electrical power
- Kilowatt and kilowatt-hour.
- Thermal capacity and Specific heat capacity

- Heat and temperature
- Latent heat of fusion and specific latent heat of fusion
- Natural radioactivity and artificial radioactivity
- Isotopes and Isobars
- α rays and β rays
- β rays and γ rays
- α rays and γ rays
- nuclear fission and nuclear fusion.

- **FACTORS AFFECTING:**

- Moment of force
- Centre of gravity
- Mechanical work done
- Mechanical Power
- Kinetic energy
- Gravitational Potential energy
- Efficiency of practical machine
- Refraction
- Refractive index
- lateral displacement
- Critical angle
- Total internal reflection
- Angular deviation
- Minimum deviation
- Focal length of lens
- Magnification of lens
- Dispersion
- Scattering
- frequency of stretched strings
- Echo
- Loudness or intensity of sound
- Pitch or shrillness
- Quality or Timbre
- Internal resistance of cell
- Resistivity of a wire
- Electromotive force
- Electrical work done
- Electrical power
- Electrical energy consumed
- Current flowing through a coil
- Transformer ratio or turns ratio

- Efficiency of a transformer
- Amount of heat absorbed or evolved during rise or fall of temperature
- Amount of heat absorbed or evolved during change of physical state.