

H2 PHYSICS DEFINITIONS LIST

Term	Definition
SECTION I: MEASUREMENT	
Chapter 1: Measurement	
Scalar	A scalar quantity is one which has <u>magnitude</u> but <u>no direction</u> .
Vector	A vector is a quantity which has <u>direction as well as magnitude</u> .
SECTION II: NEWTONIAN MECHANICS	
Chapter 2: Kinematics	
Displacement, s	Total distance moved by an object <u>along a particular direction</u> .
Speed	The rate of change of <u>distance</u> with respect to time.
Velocity, v	The rate of change of <u>displacement</u> with respect to time.
Acceleration, a	The rate of change of <u>velocity</u> with respect to time.
Average speed/velocity	The <u>average rate</u> of change of distance/displacement with respect to time.
Instantaneous Velocity	The rate of change of displacement with respect to time <u>at a particular time</u> .
Chapter 3: Dynamics	
Newton's First Law	A body <u>continues in its state of rest or uniform motion in a straight line</u> unless a <u>resultant external force</u> acts on it.
Newton's Second Law	The <u>rate of change of momentum</u> of a body is <u>proportional to the resultant force</u> acting on it and occurs <u>in the direction of the force</u> .
Newton's Third Law	If body A exerts a force on body B, then body B exerts an <u>equal but opposite</u> force on body A.
Linear Momentum	The <u>product</u> of the <u>mass</u> of an object and its <u>velocity</u> .
Impulse	Impulse is the <u>area under the force-time graph</u> .
Force, F	The <u>rate of change of momentum</u> .
Principle of Conservation of Momentum	The total momentum of a system remains <u>constant provided no external resultant forces</u> act on the system. OR The total momentum of an <u>isolated system</u> of bodies is <u>constant</u> .
Inertia	The <u>reluctance</u> of a body to start moving or to change its motion once it has started.
Equilibrium	When the <u>state</u> of an object remains <u>unchanged</u> even though two or more forces are acting on it.
Chapter 4: Forces	
Hooke's Law	The <u>force</u> needed to cause an extension/compression in a spring is <u>directly proportional to its extension/compression</u> .
Upthrust, U	It is the <u>upward force</u> acting on an object that is <u>partially or fully immersed in a fluid</u> . (RJCPromo07)
Equilibrium	A system is in equilibrium if there is <u>no resultant force</u> and

	<u>no resultant torque</u> acting on it.
Centre of Gravity	The point at which <u>all the weight</u> of an object may be considered to be acting as if the object were a particle.
Couple	A couple consists of a <u>pair of parallel forces</u> of <u>equal magnitude</u> but <u>opposite direction</u> whose lines of action do not coincide.
Moment of a Force	The moment of a force about a point is the <u>product</u> of the <u>force</u> with the <u>perpendicular distance</u> of the force from that <u>point</u> .
Torque of a Couple, τ	The torque of a couple is the <u>product</u> of <u>one of the forces</u> with the <u>perpendicular separation</u> between the couple.
Archimedes' Principle	An object <u>immersed fully or partially in a fluid</u> experiences a <u>buoyant force equal in magnitude to the weight of the fluid displaced</u> .
Centre of Mass	The point at which <u>all of the mass</u> of an object or system may be <u>considered to be concentrated</u> .
Principle of Flotation	An object floating in a fluid always <u>displaces its own weight of fluid</u> .
Rotational Equilibrium	A system is in rotational equilibrium if there is <u>no resultant torque</u> .
Chapter 5: Work, Energy and Power	
Work Done	The <u>product</u> of a <u>force</u> and the <u>displacement in the direction of the force</u> .
Power	<u>Work done per unit time</u> .
Chapter 6: Motion in a Circle	
Angular Velocity, ω	The <u>rate of change of angular displacement</u> with respect to time.
Centripetal Acceleration	Acceleration which is always <u>perpendicular to the velocity</u> and always <u>acts towards the centre</u> of the circular motion.
Uniform Circular Motion	The motion of an object moving in circular path at <u>constant speed</u> with <u>constant angular velocity</u> .
Centripetal Force	The <u>resultant perpendicular force</u> acting on an object moving in circular motion
Chapter 7: Gravitational Field	
Gravitational Field	A gravitational field due to a body is a <u>region in space</u> in which <u>another body</u> placed in the region <u>experiences a force of attraction by the first body</u> .
Newton's Law of Gravitation/Gravitational Force	Newton's law of gravitation states that the <u>force of attraction</u> between <u>two point masses</u> is <u>directly proportional</u> to the <u>product of their masses</u> and <u>inversely proportional</u> to the <u>square of their distance apart</u> .
Gravitational Field Strength, g	The gravitational field strength at a point is the <u>gravitational force per unit mass</u> experienced by a mass placed at that point.
Gravitational Potential, ϕ	Gravitational potential at a point is the <u>work done per unit mass</u> by an external agent in bringing a mass <u>from infinity to</u>

	that <u>point</u> without a change in kinetic energy. (RJCPromo07)
Gravitational Potential Energy	The Gravitational Potential Energy of a mass is defined as the <u>work done by an external agent in bringing the mass from infinity to its present location</u> (without any change in KE).
Chapter 8: Oscillations	
Amplitude	The <u>maximum displacement from the equilibrium position</u> .
Period, T	The <u>time taken to complete one cycle of oscillation</u> .
Frequency, f	The <u>number of complete cycles per second</u> made by the oscillating object.
Simple Harmonic Motion	The motion of the body whose <u>acceleration is directly proportional to its displacement from a fixed point</u> (equilibrium position) and is <u>always directed towards that fixed point</u> .
Resonance	The tendency of a system to oscillate at <u>maximum amplitude</u> at its <u>natural frequency</u> .
Forced Oscillation	When the system is forced to oscillate at a <u>frequency other than the natural frequency</u> by a <u>periodic external force</u> .
Natural Frequency	The frequency of oscillation when a system <u>oscillates freely without any external force</u> applied.
Displacement, s	The <u>distance</u> of the oscillating object <u>from its equilibrium position</u> at any instant.
SECTION III: THERMAL PHYSICS	
Chapter 9: Thermal Physics	
Internal Energy	The <u>sum of the microscopic kinetic and potential energies</u> of the molecules that make up the system.
Thermal Equilibrium	When two objects in thermal contact <u>cease to have any exchange of heat</u> .
Absolute Zero	The theoretical temperature at which the molecules of a substance have the lowest energy and hence, the substance has <u>minimum internal energy</u> .
Kelvin, K	The Kelvin is defined as <u>1/273.16</u> of the <u>temperature difference</u> between <u>absolute zero</u> and the <u>triple point of water</u> .
Specific Heat Capacity, c	It is the <u>quantity of heat required to raise the temperature of 1kg of the body by 1K</u> .
Latent Heat	It is the <u>thermal energy</u> required by matter for a <u>change in phase</u> .
Specific Latent Heat of Fusion	It is the <u>thermal energy</u> required for <u>1kg</u> of substance to change from the <u>solid phase to the liquid phase without a change in temperature</u> .
Specific Latent Heat of Vaporisation	It is the <u>thermal energy</u> required for <u>1kg</u> of substance to change from the <u>liquid phase to the gaseous phase without a change in temperature</u> .
First Law of Thermodynamics	The First Law of Thermodynamics states that the <u>internal energy</u> of a system depends only on the <u>thermodynamic</u>

	state of the system; the <u>increase</u> in the <u>internal energy</u> of a system is <u>equal</u> to the <u>sum</u> of the <u>heat supplied</u> to the system and the <u>work done on the system</u> .
Triple Point of Water	The particular temperature and pressure at which the <u>three states of water</u> can co-exist in equilibrium.
Heat Capacity	The <u>quantity of heat</u> required to <u>raise the temperature</u> of the body by <u>1K</u> .
Ideal Gas	A gas in which <u>all collisions</u> between the atoms and molecules are <u>perfectly elastic</u> and which there are <u>no</u> intermolecular attractive or repulsive forces.
SECTION IV: WAVES	
Chapter 10: Wave Motion	
Wavelength, λ	The <u>distance between corresponding points in successive waveforms</u> , such as two successive crests or two successive troughs.
Intensity, I	The <u>amount of energy incident per unit area per unit time</u> .
Phase	The <u>stage of motion</u> of the particle <u>with respect to other particles</u> in the same wave or another wave.
Transverse Waves	A transverse wave is one in which particles of the medium move in a direction <u>perpendicular</u> to the direction of travel of the wave.
Longitudinal Waves	A longitudinal wave is one in which particles of the medium move in a direction <u>parallel</u> to the direction of travel of the wave.
Polarised Waves	<u>All particles vibrate in the same plane</u> at all times
Electromagnetic Radiation	A self-propagating <u>transverse wave</u> in space with <u>electric and magnetic</u> components.
Chapter 11: Superposition	
Principle of Superposition	The principle of superposition states that the <u>resultant displacement</u> at any point is the <u>vector sum of the individual displacement</u> due to each wave arriving at that point. (RJCCT108)
Diffraction	Diffraction is the <u>bending of waves through an aperture or around an obstacle</u> .
Interference	Interference is the <u>superposition of two or more coherent waves</u> to give a resultant wave whose resultant amplitude is given by the <u>principle of superposition</u> . (RJCNotes) OR Interference is the <u>superposition of waves</u> in the same region and time so as to form <u>regions of maxima</u> (bright) <u>and minima</u> (dark) due to waves meeting constructively and destructively respectively. (RJCPrelim07)
Coherence	Sources having <u>constant phase difference</u> .
SECTION V: ELECTRICITY AND MAGNETISM	
Chapter 12: Electric Fields	

Electric Field Strength, E	The electric field strength at a point is defined as the <u>force per unit charge</u> acting on a <u>small positive test charge</u> placed at that point.
Coulomb's Law	The <u>force</u> between <u>two point charges</u> is <u>directly proportional</u> to the <u>product of the charges</u> and <u>inversely proportional</u> to the <u>square of the distance between the charges</u> .
Uniform Electric Field	Electric field strength is <u>equal in magnitude</u> and has the <u>same direction at all points</u> in the region.
Electric Potential, ϕ	The electric potential at a point in an electric field is the <u>work done per unit charge</u> in bringing a <u>positive test charge from infinity to the point</u> (without a change in kinetic energy).
Chapter 13: Current of Electricity	
Electric Current, I	The <u>net amount of charge passing through a point per unit time</u> .
Coulomb, C	One coulomb is the <u>quantity of electric charge</u> that passes a given point in a circuit in <u>one second</u> when there is a <u>constant current of one ampere</u> .
Potential Difference, E	The potential difference between two points in a circuit is the <u>amount of electric energy</u> that is <u>converted to other forms of energy</u> when a <u>unit charge</u> passes from one point to the other.
Volt, V	One volt is the <u>potential difference between two points</u> in a circuit in which <u>one joule of energy</u> is <u>converted</u> when <u>one coulomb of charge</u> passes from one point to the other.
Resistance, R	The electrical resistance of a conductor is defined as the <u>ratio of the p.d. across it to the current through it</u> .
Ohm, Ω	One ohm is defined as the <u>resistance</u> of a conductor in which a <u>current of one ampere</u> passes through it when the <u>p.d. across it is one volt</u> .
Electromotive Force (e.m.f.)	The e.m.f. of a source is defined as the <u>amount of energy converted from other forms to electrical energy</u> when the <u>source drives a unit charge round a complete circuit</u> .
Ampere, A	<u>One coulomb per second</u> .
Chapter 15: Electromagnetism	
Magnetic Flux Density, B	The flux density of a magnetic field is the <u>force per unit length</u> on a straight conductor carrying <u>unit current</u> placed <u>perpendicularly</u> to the field. (RJCT208)
Tesla, T	The <u>magnetic flux density</u> of a magnetic field is one tesla if the <u>force</u> acting on <u>1m length</u> of a <u>conductor carrying 1A of current</u> placed <u>perpendicular</u> to the field is <u>1N</u> .
Electronvolt, eV	The electronvolt is the <u>energy gained by an electron</u> when it is <u>accelerated</u> through a <u>p.d. of one volt</u> .
Chapter 16: Electromagnetic Induction	
Magnetic Flux, ϕ	Magnetic flux through a plane surface is the <u>product of the</u>

	<u>area and the magnetic flux density that passes through the area perpendicularly.</u>
Weber	One weber is the magnetic flux if a field of flux density one tesla exists at right angles to an area of one metre square.
Magnetic Flux Linkage, Φ	The magnetic flux linkage of a coil is the magnetic flux passing through each turn of the coil multiplied by the number of turns of the coil.
Faraday's Law	Whenever there is a change in magnetic flux linkage of a circuit or coil, an e.m.f. is induced in the circuit and the magnitude is <u>directly proportional to the rate of change of magnetic flux linkage</u> of the circuit or coil.
Lenz's Law	Lenz's Law states that the <u>direction of the induced current</u> is such as to <u>oppose the change in flux</u> which causes it.
Chapter 17: Alternating Current	
RMS value of an alternating current	It is the <u>value of the steady direct current</u> which would dissipate <u>heat at the same rate</u> in a given resistance as the alternating current.
Mean Power	The mean power dissipated by a resistive load is <u>half the maximum power</u> for a sinusoidal AC.
Sinusoidal AC/Voltage	Current/voltage <u>varies periodically with time</u> in <u>magnitude and direction.</u>
Rectification of an AC	Conversion of <u>AC to DC.</u>
Half-wave Rectification	For <u>half the cycle</u> , the <u>diode allows current to flow</u> but for the <u>other half</u> of the cycle, the <u>current flow is very small</u> due to the <u>high resistance</u> of the diode being in <u>reverse bias.</u>
SECTION VI: MODERN PHYSICS	
Chapter 18: Quantum Physics	
Photoelectric Effect	The <u>emission of electrons from a metal</u> as a result of <u>light with sufficiently short wavelength</u> falling on it.
Work function, Φ	The work function of a material is defined as the <u>minimum amount of energy</u> required <u>to remove a free electron from the surface</u> of a material
Square of the absolute magnitude of the Wave Function, $\Psi ^2$	<u>Probability density</u> of finding the particle at a particular point, at a particular time.
Potential Barrier	A potential barrier is a region within which the <u>potential energy of the particle</u> is much higher than immediately <u>outside it.</u>
Photon	A <u>quantum of electromagnetic energy.</u>
Ionisation Energy	The ionization energy of an atom is the <u>minimum energy</u> required to <u>remove an electron completely from the atom.</u>
Ionisation	The process of <u>creating charged particles.</u>
Transmission Coefficient	The <u>probability</u> of the particle being <u>transmitted.</u>
Reflection Coefficient	The <u>probability</u> of the particle being <u>reflected.</u>
Chapter 19: Lasers and Semiconductors	
Spontaneous Emission	A <u>photon</u> is <u>emitted by an atom</u> randomly and in <u>any</u>

	<u>direction without any external stimulation.</u>
Stimulated Emission	An <u>incoming photon, whose energy is exactly equal to the excitation energy of the atom, induces the excited atom to fall to a lower energy level and releases a photon</u> in the process. This photon released is similar to the one which induces its emission. The two photons are emitted at the same time and in the <u>same direction.</u>
Population Inversion	When there are <u>more atoms in the excited state than in the ground state.</u>
Intrinsic Semiconductor	A semiconductor <u>without added impurities.</u>
Extrinsic Semiconductor	A semiconductor <u>with added impurities.</u>
P-N Junction	A P-N Junction is a <u>single semiconductor crystal</u> that has been <u>selectively doped</u> so that one region is n-type material and the adjacent region is p-type material.
Stimulated Absorption	When an <u>atom at a lower energy level absorbs a photon and moves to a higher energy level.</u>
Chapter 20: Nuclear Physics	
Nucleon Number (Mass Number)	The number of <u>nucleons</u> (protons and neutrons) in the nucleus.
Proton Number (Atomic Number)	The number of <u>protons</u> in the nucleus.
Mass Defect	The <u>difference</u> between the <u>sum of the individual masses of protons and neutrons</u> and the <u>mass of a nucleus.</u>
Binding Energy	The <u>amount of energy</u> needed to <u>split a nucleus into its individual nucleons.</u>
Binding Energy per Nucleon	Binding energy divided by the mass or nucleon number of the nucleus.
Nuclear Fusion	Process by which nuclei with <u>mass numbers lower than 56 combine</u> to form nuclei of <u>higher mass numbers</u> which are <u>more stable.</u>
Nuclear Fission	Process by which nuclei of <u>mass numbers larger than 56 break up</u> to form <u>lighter nuclei</u> which are <u>more stable.</u>
Activity, A	The <u>number of atoms</u> of a radioactive substance that <u>decay per unit time.</u>
Decay constant	The <u>probability of decay per nucleus per unit time.</u>
Half life	Half life of a radioactive element is <u>the time taken</u> for a <u>sample of atoms</u> to <u>decay to half their initial number.</u>
Neutron Number	The number of <u>neutrons</u> in the nucleus.
Radioactivity	The <u>spontaneous emission</u> of α , β or γ <u>radiation by a parent nucleus</u> which results in itself being <u>transformed</u> into a completely different <u>daughter nucleus.</u>