H2 PHYSICS DEFINITIONS LIST

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

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

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

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

Electric Field Strength, E	The electric field strength at a point is defined as the force per unit charge acting on a small positive test charge placed at that point.
Coulomb's Law	The force between two point charges is directly proportional to the product of the charges and inversely proportional to the square of the distance between the charges.
Uniform Electric Field	Electric field strength is equal in magnitude and has the same direction at all points in the region.
Electric Potential, ϕ	The electric potential at a point in an electric field is the work done per unit charge in bringing a positive test charge from infinity to the point (without a change in kinetic energy).
Chapter 13: Current of Electricity	
Electric Current, I	The net amount of charge passing through a point per unit time.
Coulomb, C	One coulomb is the quantity of electric charge that passes a given point in a circuit in one second when there is a constant current of one ampere.
Potential Difference, E	The potential difference between two points in a circuit is the amount of electric energy that is converted to other forms of energy when a unit charge passes from one point to the other.
Volt, V	One volt is the potential difference between two points in a circuit in which one joule of energy is converted when one coulomb of charge passes from one point to the other.
Resistance, R	The electrical resistance of a conductor is defined as the ratio of the p.d. across it to the current through it.
Ohm, Ω	One ohm is defined as the resistance of a conductor in which a current of one ampere passes through it when the p.d. across it is one volt.
Electromotive Force (e.m.f.)	The e.m.f. of a source is defined as the amount of energy converted from other forms to electrical energy when the source drives a unit charge round a complete circuit.
Ampere, A	One coulomb per second.
Chapter 15: Electromagnetism	
Magnetic Flux Density, B	The flux density of a magnetic field is the force per unit length on a straight conductor carrying unit current placed perpendicularly to the field. (RJCCT208)
Tesla, T	The magnetic flux density of a magnetic field is one tesla if the force acting on 1m length of a conductor carrying 1A of current placed perpendicular to the field is 1N.
Electronvolt, eV	The electronvolt is the energy gained by an electron when it is accelerated through a p.d. of one volt.
Chapter 16: Electromagnetic Induction	
Magnetic Flux, ϕ	Magnetic flux through a plane surface is the product of the

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

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