SCHEME OF WORK GRADE XI

LEARNING CONTENTS AND STUDENTS' LEARNING OUTCOMES GRADE XI(SUBJECT:PHYSICS)

Contents:	**Students' Learning Outcomes**	**R**	**U**	**Ap.**	**An.**	**E**	**C**
Part-I(Mechanics)	Students will be able to:						
Unit-1(MEASUREMENT)							
The Scope of Physics	• Describe the scope of Physics in science, technology and Society.	*					
SI Basic and Derived Units	• State and define SI base units and derived units for various measurements.	*					
	• Discuss the relation of SI base units and derived units with respect to various measurements.						
	• Express derived units as products or quotients of the base units.		*				
Errors and Uncertainties	• Realize all measurements contain some uncertainty?			*			
	• Distinguish between systematic errors (including zero errors) and random errors.				*		
	• Infer that least count or resolution of a measuring instrument is the smallest increment measurable by it.				*		
Precision and Accuracy	• Differentiate between Precision and Accuracy in a measurement.				*		
	• Evaluate absolute uncertainty in a measurement and calculate relative uncertainty (Percentage Error)					*	
	• Indicate answers in scientific notations with correct no. of significant figures and units in all numerical and practical work.		*				
Investigation Skills/Laboratory Work							

	• Demonstrate the information of general safety rules of the laboratory and proper use of safety equipment.			*			
	• Measure, using appropriate techniques, the length, mass, time, temperature and electrical quantities by making use of both analogue scales and digital displays particularly short time interval by ticker timer and by C.R.O.			*			
	• Measure length and diameter of a solid cylinder and hence estimate its volume quoting proper number of significant figures.			*			
	• Explain the importance of increasing the number of readings in an experiment.		*				
Science, Technology and Society Connections							
	• Present data in a well-structured tabular form for easy interpretation (e.g. ball bearings investigation).					*	
	• Display data by drawing appropriate graphs for the above.			*			
	• Interpret the information from linear or nonlinear graphs/curves by measuring slopes and intercepts in newspaper or magazines				*		
	• Argue that all daily life measurements are uncertain to some extent.					*	
Unit-2(VECTORS AND EQUILIBRIUM)							
Cartesian coordinate system	• Use the Cartesian coordinate system.			*			
Addition of vectors by head to tail rule	• Determine the sum of vectors using head to tail rule.					*	
Addition of vectors by perpendicular components	• Resolve a vector into two perpendicular components.			*			
	• Calculate the sum of vectors using perpendicular components.				*		

Scalar product of two vectors	• Explain scalar product of two vectors in term of angle between them.			*			
Vectors product of two vectors	• Explain vector product of two vectors in term of angle between them.			*			
	• Point out the method to determine the direction of vector product of two vectors.				*		
Torque	• Define the torque as vector product i.e . r x F.	*					
	• Describe applications of torque or Moment of force	*					
Equilibrium of forces and Torques	• Verify first condition of equilibrium and Second condition of equilibrium.					*	
	• Solve equilibrium problems involving forces in two dimensions.			*			
Investigation Skills/Laboratory Work							
	• Determine the weight of a body by vector addition of forces using rectangular components.			*			
	• Verify the two conditions of equilibrium using a suspended metre rod.			*			
Science, Technology and Society Connections							
	• Identify the use of long handle spanner to turn a bolt.		*				
	• Explain why the height of racing cars is kept low.		*				
	• Explain why buses and heavy trucks have large steering wheels.		*				
	• Describe how cranes are able to lift very heavy loads without toppling.	*					
Unit-3(FORCES AND MOTION)							
Displacement	• Describe Distance and Displacement.	*					

Average velocity and instantaneous velocity	• Compare average speed and average velocity.				*		
	• Describe average velocity, instantaneous velocity, variable velocity and uniform velocity.	*					
Average acceleration and instantaneous acceleration	• Define and explain average and instantaneous acceleration.	*		*			
	• Understand positive and negative acceleration, uniform and variable acceleration.		*				
	• Describe motion in straight line and interpret displacement-time and velocity-time graphs of objects moving along the straight line.	*					
Review of equations of uniformly accelerated motion	• Apply equation of uniformly accelerated motion to solve problems.			*			
Inertia and Newton's 1st Law of Motion	• Define mass as the property of body which resist change in motion i.e inertia and state and explain Newton's 1st Law of motion.	*					
Momentum and Newton's 2nd Law of Motion	• Describe the Newton's second law of motion as rate of change of momentum.	*					
Impulse	• Calculate impulse of force in an event such as bat hitting a ball or tennis racket hitting a ball using Force-Time Graph			*			
Newton's 3rd Law and Law of Conservation of Momentum	• Co-relate Newton's third law of motion and conservation of momentum.			*			
	• Conclude that momentum is conserved in all situations.					*	

	• Describe that while momentum of a system is always conserved in interaction between bodies some change in K.E. usually takes place.	*					
Elastic collisions in one dimension	• Identify that for a perfectly elastic collision, the relative speed of approach is equal to the relative speed of separation.			*			
	• Solve different problems of elastic and inelastic collisions between two bodies in one dimension by using law of conservation of momentum.			*			
Projectile motion	• Demonstrate that projectile motion is two dimensional motion in a vertical plane.			*			
	• Create the ideas of a projectile in the absence of air resistance that.						*
	• Horizontal component (VH) of velocity is constant. • Acceleration is in the vertical direction and is the same as that of a vertically free falling object. • (c) The Horizontal motion and vertical motion are independent of each other.						
	• Evaluate using equations of uniformly accelerated motion that for a given initial velocity of frictionless projectile.					*	
	(a) How higher does it go?						
	(b) How far would it go along the level land?						
	(c) Where would it be after a given time?						
	(d) How long will it remain in air?						
	• Determine for a projectile launched from ground height.			*			
	(a) Launch angle that results in the maximum range.						

		(b) Relation between the launch angles that result in the same range.						
		• Describe how air resistance affects both the horizontal component and vertical component of velocity and hence the range of the projectile.	*					
Investigation Skills/Laboratory Work								
		• Investigate the value of “g” by free fall method			*			
		• Investigate momentum conservation by colliding trolleys and ticker-timer for elastic and inelastic collisions			*			
Science, Technology and Society Connections								
		• Outline the forces involved in causing a change in the velocity of a vehicle, when:		*				
		(a) coasting with no pressure on the accelerator.						
		(b) pressing on the accelerator.						
		(c)pressing on the brakes.						
		(d) passing over an icy patch on the road.						
		(e)climbing and descending hills.						
		• Investigate and explain the effect of the launch height of projectiles (e.g. a shot put launched from a shoulder height) on a maximum range and the effect of launch angle for a given height.			*			
		• Describe to what extent the air resistance affects various projectiles in sports	*					
		• Evaluate the effectiveness of some safety features of motor vehicles in connection with the changing momentum such as safety helmet, seat belt, head rest of the car seat.					*	

		• Describe the conservation of momentum for (i) car crashes (ii) ball & bat.	*					
		• Assess the reasons for the introduction of low speed zones in built-up areas and the addition of air bags and crumple zones to vehicles with respect to the concepts of impulse and momentum.					*	
		• Explain in terms of law of conservation of momentum, the motion under thrust of a rocket in a straight line considering short thrusts during which the mass remains constant]			*			
Unit-4(WORK, ENERGY, POWER and EFFICIENCY)								
Work		• Define work and its SI unit.	*					
		• Point out conditions for positive, negative and zero work.			*			
Energy and its fundamental Forms		• Realize that energy is the ability to do work.			*			
		• Recognize that units of energy are same as that of work.			*			
		• Point out that there can be very small units of energy such as eV and very large units as KWH.			*			
		• Realize that there are two fundamental forms of mechanical energy, K.E and P.E.			*			
Relation between Work and Energy		• Demonstrate that work done on a system can either be converted into K.E or P.E e.g. **F.d**=1/2 mv2			*			
Work and Gravitationional force		• Show that when the height of body is increased, it is moved against gravitational force and hence negative work is done, which is stored as gravitational P.E.			*			

	• Realize that when a body is falling along gravitational force, its gravitational P.E is decreasing and it is being converted into K.E.			*			
Work done by Variable Force	• Plot a variable force displacement graph for a given system and find the work done by calculating area under the graph.			*			
	• Plot a force extension graph for a spring and hence determine the work done during the extension process and realize that this work is stored as elastic P.E.			*			
Power	• Define Power as time rate of doing work OR time rate of emitting or absorbing energy and discuss its SI units.	*					
	• Derive and use the relation P=F.v for moving system i.e vehicles			*			
Efficiency	• State efficiency as work output/energy input OR power output/power input.	*					
	• Realize that efficiency of a practical system can never be 100%.						
	• Solve problems involving power and efficiency of system with particular reference to solar and wind system.			*			
Science, Technology and Society Connections							
	• Identify, by estimating the cost, benefits of application of scientific principles related, to work and energy in lifting objects by a crane.		*				
	• Explain why a car going up a hill requires lower top speed than a car going on the flat.		*				
	• Identify energy conversions.		*				
	(a) moving car engine						
	(b) thermal power station						
	(c)Hydroelectric power station						

	• Investigate and explain how global climate is determined by energy transfer from the Sun and is influenced by a dynamic process (e.g. cloud formation and the earth's rotation) and static conditions (e.g. the position of mountain ranges and oceans)			*			
	• Explain how trash can be utilized for producing energy (bio-gas).		*				
Unit-5(ROTATIONAL AND CIRCULAR MOTION)							
Kinematics of angular motion	• Define angular displacement, angular velocity and angular acceleration and Derive the relations between linear and angular quantities.	*					
	• State and use of equations of angular motion to solve problems involving rotational motions.			*			
Centripetal force and centripetal acceleration	• Describe qualitatively motion in a curved path due to a perpendicular force.	*					
	• Derive and use centripetal acceleration $a = r\omega^2$, $a = v^2/r$.			*			
	• Solve problems using centripetal force $F = mr\omega^2$, $F = mv^2/r$.			*			
	• Describe situations in which centripetal force is caused by normal force. i.e Tension, friction and gravitational force.	*					
	• Describe the equation $\tan\theta = v2/rg$, relating banking angle θ to the speed v of the vehicle and the radius of curvature r.	*					
Moment of inertia and Angular Momentum	• Derive a relation between torque, moment of inertia and angular acceleration.			*			
	• Define moment of inertia of a body and angular momentum.	*					
	• Illustrate conservation of angular momentum as a universal law and describe examples of conservation of angular momentum.			*			

	• Review the formulae of moment of inertia of various bodies for solving problems.				*		
Rotational Kinetic Energy	• Investigate the K.E associated with rotating body i.e Solid cylinder, Hollow Cylinder, Sphere.			*			
Investigation Skills/Laboratory Work							
	• Determine the moment of inertia of metal lamina by Ferguson method.			*			
Science, Technology and Society Connections							
	• Assess the suitability of the recommended speed limit for the given data on the banking angle and radius of curvature of some roads.					*	
	• Conclude the experience of roller coaster rides in the amusement parks.					*	
Unit-6(GRAVITATION)							
Newton's Law of Gravitation	• State Newton's Law of Gravitation.	*					
	• Explain gravitational constant 'G' and derive its units.		*				
	• Solve problems about gravitational force realize that gravitational force is a very weak force.			*			
Gravitational Field around a spherical body	• Define gravitational field strength at a point as gravitational force per unit mass.	*					
	• Explain that a spherical body may be considered as a point mass concentrated at the center of sphere, by considering spherical body and point mass , derive a formula for the gravitational field strength at the sight of point mass		*				

	• Calculate the gravitational field strength inside and outside the earth. By considering the value of 'g' on the surface of earth find the relation for mass of earth.			*			
Gravitational P.E	• Define gravitational P.E as work done in moving a mass from infinity to reference point.	*					
	• Define gravitational P.E between two point masses and write a relation for it.	*					
	• Realize that gravitational P.E is negative because P.E at infinity is taken as zero.			*			
Escape Velocity	• Realize that Positive energy in the form of K.E is required to lift a body from surface of earth to infinity, hence by applying law of conservation of energy calculate the formula for escape velocity at the surface of earth.			*			
Planetary motion	• Recognize that gravitational force can act as centripetal force and thereby cause orbital motion.			*			
	• Derive relations for orbital velocity, time period and orbital radius.			*			
	• Establish a relation between orbital time period and orbital radius of a satellite/planet and hence arrive at Kepler's Law of Period.			*			
Weightlessness in Satellites and artificial gravity	• Discuss the condition for weightlessness of body present in an elevator and hence apply this condition to bodies present in a satellite.		*				
	• Consider design and rotational motion of satellite to produce artificial equal to that of earth.		*				
Geostationary orbits	• Define geostationary orbit/satellite explaining the required conditions to be geostationary.	*					

	• Derive the formula for orbital radius of geostationary satellite.			*			
	• Explain applications of geostationary satellites.			*			
Science, Technology and Society Connections			*				
	• Appreciate that Use of geostationary satellites has revolutionized global communication.			*			
	• Evaluate uses of Satellites in remote sensing and accurate weather forecasting.					*	
	• Appreciate the role of gravitational field of planets in controlling the motion of deep space probes destined for interstellar space.				*		
Unit-7(FLUID DYNAMICS)							
Streamline and Turbulent flow of a Fluid	• Define the terms: steady (streamline or laminar) flow of an incompressible and non-viscous fluid.	*					
	• Analyze that at a sufficiently high velocity, the flow of a fluid undergoes a transition from laminar to turbulant condition.				*		
	• Categorize that the majority of practical examples of fluid flow and resistance to motion in fluids involve turbulent rather than laminar conditions.			*		*	
Equation of continuity	• Describe equation of continuity Av = Constant, based upon conservation of mass, for the flow of an ideal and incompressible fluid and solve problems using it.	*					
Bernoullie's equation	• State and derive Bernoulli equation in the form $P + \frac{1}{2} \rho v^2 + \rho gh$ = constant ,for the case of horizontal tube of flow.	*					
Applications of Bernoulli's equation	• Interpret and apply Bernoulli Effect in the: filter pump, Venturi meter, in, atomizers, flow of air over an aero foil and in blood physics.			*			

Viscous fluids	• Demonstrate that real fluids are viscous fluids.			*			
Fluid Friction	• Judge that viscous forces in a fluid cause a retarding force on an object moving through it.					*	
	• Explain how the magnitude of the viscous force in fluid flow depends on the shape and velocity of the object.		*				
	• Use SI base units to confirm the form of the equation F = Aηrv where 'A' is a constant without units (Stokes' Law) for the drag force under laminar conditions in a viscous fluid.			*			
Terminal velocity	• Apply Stokes' law to derive an expression for terminal velocity of spherical body falling through a viscous fluid.			*			
Investigation Skills/Laboratory Work							
	• Investigate the effect of moving air on pressure by demonstrating with Venturi meter			*			
	• Investigate the fall of spherical steel balls through a viscous medium and determine terminal velocity and hence viscosity of fluid by drawing 'v' vs 'r2' graph.			*			
	• Describe of systolic pressure and diastolic pressure and use mercury sphygmomanometer to measure blood pressure.	*					
Science, Technology and Society Connections							
	• Show that a table tennis ball can be made suspended in the stream of air coming from the nozzle of hair dryer.			*			
	• Explain the streamlined designing of racing cars and boats.		*				
	• Explain that the streamlined bodies of dolphins assist their movement in water.		*				

	• Describe that when water falls from a tap, its speed increases and so its cross sectional area decreases as mandated by the continuity equation.	*					
	• Describe that a stream of air passing over a tubes dipped in liquid will cause the liquid to rise in the tube. This effect is used in perfume bottles and paint sprayers.	*					
	• Explain why a chimney works best when it is tall and exposed to air currents which reduces the pressure at the top and forces the upward flow of smoke.		*				
	• State qualitative explanations in terms of turbulence and Bernoulli Effect for the swing of spinning cricket ball and the lift of a spinning golf ball.	*					
	• Describe that a filter pump has constriction in the centre, so that a jet of water from the tap flows faster here.	*					
	• Explain that the carburetor of a car engine uses a Venturi duct to feed the correct mix of air and petrol to the cylinders.		*				
Part-II(WAVES AND OSCILLATIONS)							
Unit-8 (OSCILLATIONS)							
Circular motion and SHM	• Compile simple examples of free oscillations.			*			
	• Adapt/decide necessary conditions for execution of simple harmonic motions.			*			
	• Examine that when an object moves in a circle, the motion of its projection on the diameter of the circles is SHM.			*	*		

	• Define the terms displacement, amplitude, period, frequency, angular frequency and phase and express the period in terms of both frequency and angular frequency.	*					
	• Identify and use the equation; a= - ω2x as the defining equation of SHM.			*			
Practical SHM system	• Prove that the motion of mass attached to a spring is SHM.			*			
	• Analyze that the motion of a simple pendulum is SHM and calculate its time period.				*		
Energy conservation in SHM	• Examine the interchanging between kinetic energy and potential energy during SHM.			*			
Free and forced oscillations	• Point out practical examples of free and forced oscillations			*			
Resonance	• Compare graphically how the amplitude of a forced oscillation changes with frequency near to the natural frequency of the system.				*		
	• Compose qualitatively the factors which determine the frequency response and sharpness of the resonance.			*			
Damped oscillations	• Relate practical examples of damped oscillations with particular reference to the effects of the degree of damping and the importance of critical damping in cases such as a car suspension system.				*		
Investigation Skills/Laboratory Work							
	• Verify that the time period of the simple pendulum is directly proportional to the square root of its length and hence find the value of g from the graph.			*			

	• Determine the acceleration due to gravity by oscillating mass-spring system.			*			
	• Determine the value of g by vibrating a metal lamina suspending from different points.			*			
Science, Technology and Society Connections							
	• Explain the importance of critical damping in a car suspension system.		*				
	• Identify that there are some circumstances in which resonance is useful such as tuning a radio, microwave oven and other circumstances in which resonance should be avoided such as aeroplane's wing or helicopter rotor, suspension bridge etc.		*				
Unit-9(WAVES)							
Periodic waves	• Indicate what is meant by wave motion as illustrated by vibrations in ropes, springs and ripple tank.		*				
	• Justify that mechanical waves require a medium for their propagation while electromagnetic waves do not.				*		
	• Define and apply the following terms to the wave model; medium, displacement, amplitude, period, compression, rarefaction, crest, trough, wavelength, velocity.	*		*			
	• Solve problems using the equation: $v = f\lambda$.			*			
Travelling waves	• Demonstrate that energy is transferred due to a travelling wave.			*			
Transverse and longitudinal waves	• Compare transverse and longitudinal waves.				*		
Speed of sound in air	• Infer that sound waves are vibrations of particles in a medium.				*	*	

Newton's formula and Laplace correction	• Explain that speed of sound depends on the properties of medium in which it propagates and describe Newton's formula of speed of waves in a medium.		*				
	• Identify the factors on which speed of sound in air depends.			*			
Superposition of waves	• Illustrate the principle of superposition of two waves from coherent sources.			*			
	• Describe the phenomenon of interference of sound waves.	*					
	• Demonstrate the phenomenon of formation of beats due to interference of non-coherent sources.			*			
Stationary waves	• Describe the formation of stationary waves using graphical method	*					
Modes of vibration of strings	• Distinguish modes of vibration of strings.				*		
	• Define the terms node and antinodes.	*					
Vibrating air columns and organ pipes	• Demonstrate formation of stationary waves in vibrating air columns.			*			
Doppler effect and its applications	• Compare the observed change in frequency of a wave coming from a moving object as it approaches or moves away (i.e. Doppler effect).				*		
	• *Conclude* that Doppler effect is also applicable to e.m. waves.					*	
Generation, detection and use of ultrasonic	• Express the principle of the generation and detection of ultrasonic waves using piezo- electric transducers.			*			
	• Describe the main principles behind the use of ultrasound to obtain diagnostic information about internal structures.	*					
Investigation Skills/Laboratory Work							

	• Investigate, sketch and interpret the behaviour of wave fronts as they reflect, refract, and diffract by observing (i) Pond ripples / ocean waves / harbour waves / amusement park waves pools.			*			
	• Determine frequency of A.C. by Melde's apparatus/electric sonometer.			*			
	• Investigate the laws of vibration of stretched strings by sonometer or electromagnetic method.				*		
	• Determine the wavelength of sound in air using stationary waves and to calculate the speed of sound using resonance tube.			*			
	• Illustrate the interference of ultrasonic waves in a Young's experiment arrangement and determine the wavelength of ultrasonic waves.			*			
Science, Technology and Society Connections							
	• Explain the applications of Doppler effect such as radar, sonar, astronomy, satellite and radar speed traps.		*				
	• Outline some cardiac problems that can be detected through the use of the Doppler's effect.			*			
	• Describe the working of ultrasonic cleaners.	*					
Part-III(PHYSICAL OPTICS)							
Unit-10(PHYSICAL OPTICS)							
Nature of light	• Recognize light waves as a part of electromagnetic waves spectrum.			*			
Wave front	• Illustrate the concept of wave front.			*			

Huygen's principle	• State Huygen's principle and use it to construct wave front after a time interval.	*					
Interference	• State the necessary conditions to observe interference of light. i.e coherent sources.	*					
Young's double slit experiment	• Demonstrate young's double slit experiment and the evidence it provides to support the wave theory of light.			*			
	• Point out colour pattern due to interference in thin films.				*		
Diffraction	• Describe and explain diffraction at a narrow slit.	*					
	• Explain diffraction grating and connect that interference occurs between waves that have been diffracted from adjacent slits.		*				
	• Develop the use of a diffraction grating to determine the wavelength of light and carry out calculations using $d\sin\theta=n\lambda$.			*			
	• Demonstrate the phenomena of diffraction of x-rays through crystals. (bragg's law)			*			
Polarization	• Explain polarization as a phenomenon associated with transverse waves.		*				
	• Explain how plane polarized light is produced and detected.		*				
	• Identify and express that polarization is produced by a Polaroid.			*			
	• Explain the effect of rotation of Polaroid on Intensity of light(Malu's Law)		*				
Investigation Skills/Laboratory Work							
	• Investigate that light can be diffracted but needs a very small slit because the wavelength of light is small.			*			
	• Measure the slit separation/ grating element 'd' of a diffraction grating by using the known wavelength of laser light.			*			

	• Demonstrate the interference, diffraction and polarization of e.m. Waves by using microwave apparatus.			*			
	• Determine the wavelength of light by using a diffraction grating and spectrometer.			*			
	• Determine the pick count of a nylon mesh by using a diffraction grating and laser.			*			
	• Demonstrate polarization of light waves using two Polaroid glasses and LDR and hence verify Malus' law.			*			
	• Measure the diameter of a wire or hair using laser.			*			
Science, Technology and Society Connections							
	• Describe the diffraction of X-rays to study the crystalline structures of various materials. Explain the use of Polaroid in the sky photography, concentration of sugar and tartaric acid in solutions, stress analysis of materials.	*					
Part-IV(THERMAL PHYSICS)							
Unit-11(THERMODYNAMICS)							
Thermodynamics	• Define thermodynamics and various terms associated with it.	*					
Thermal equilibrium	• Illustrate that thermal energy is transferred from a System at higher temperature to a System at lower temperature.			*			
	• Epicts that Systems of equal temperatures are in thermal equilibrium.			*			

Internal energy	• Explain that internal energy is determined by the state of the system and that it can be expressed as the sum of the random distribution of kinetic and potential energies associated with the molecules of the system.		*				
	• Relate a rise in temperature of a body to an increase in its internal energy. ($\delta u = mc\delta t$)			*			
	• Describe the equivalence of heat, energy and work.	*					
First law of thermodynamics	• Describe the first law of thermodynamics expressed in terms of the change in internal energy, the heating of the system and work done on the system.	*					
	• Explain that first law of thermodynamics expresses the conservation of energy.		*				
	• Apply 1st Law of thermodynamics to systems with constant volume, constant pressure, constant temperature and thermal isolation.			*			
Molar specific heats of a gas	• Define the terms, Heat Capacity, specific heat and molar specific heats of a gas.	*					
	• Apply first law of thermodynamics to derive $C_p - C_v = R$.			*			
Heat engine	• State the working principle of heat engine.	*					
Second law of thermodynamics	• State and explain two versions of second law of thermodynamics. (kelvin and clausius)	*					
Carnot's cycle	• Explain the working principle of Carnot's engine		*				
	• Explain that the efficiency of a Carnot engine is independent of the nature of the working substance and depends on the temperatures of hot and cold reservoirs.		*				

Refrigerator	• Recognize that refrigerator is a heat engine operating in reverse as that of an ideal heat engine.			*			
	• Derive an expression for the coefficient of performance of a refrigerator.			*			
Entropy	• Define Entropy and describe that change in entropy is positive when heat is added and negative when heat is removed from the system.	*					
	• Explain that in any natural process, the total entropy of interacting systems always increases. (e.g. Mixing of hot and cold water)		*				
	• Explain that increase in entropy means unavailability of energy for conversion into useful work hence degradation of energy.		*				
Investigation skills/laboratory work							
	• Determine the mechanical equivalent of heat by electric method.			*			
	• Determine the specific heat of solid by electrical method. (block calorimeter method)			*			
Science, Technology and Society Connections							
	• Describe the working of petrol engine and diesel engine.	*					
	• Evaluate environmental crisis as an entropy crisis.					*	