City Governments Of Addis Ababa Education bureau
Curriculum development and implementation directorate.

Subject Physics GRADE 11 make up class						
No	Unit	Content	Sub content	No of periods (at normal condition)	No of condensing periods	Outcomes of the unit
	1	Measurement and practical work	1.1 Science of measurement 1.2 Errors in measurement 1.3 Precision, accuracy and significance 1.4 Report writing	8	1	✓ State the scientific method, what it is and its key sections. ✓ Choose appropriate units for data that will be collected. ✓ Define the term uncertainty. ✓ Appreciate some techniques to determine the uncertainty in measurements. ✓ State the meanings of the terms random error, systematic error and zero error. ✓ Identify some techniques to minimise errors. ✓ Define the terms precision, accuracy and significance. ✓ Appreciate the importance of the precision of the measuring instrument. ✓ Investigate some useful techniques for writing scientific reports.

	2	Vector quantities	2.1 Types of vector 2.2 Resolution of vectors 2.3 Vector addition and subtraction 2.4 Multiplication of vectors	18	3	✓ Appreciate the meaning of the terms vector and scalars (including examples). ✓ State the different types of vector. ✓ Show how to use vector notation. ✓ Resolve a vector into two components. ✓ Calculate vectors by graphical and mathematical methods. ✓ Appreciate the parallelogram rule and the triangle rule. ✓ Calculate the scalar product of two vectors. ✓ Project one vector onto another. ✓ Use the scalar product to test for orthogonal vectors. ✓ Use the vector product to test for collinear vectors.
	3	Kinematics	3.1 Motion in a straight line 3.2 Motion in a plane	20	4	✓ Define the term reference frame. ✓ Explain the difference between average speed (velocities) and instantaneous speed (velocity). ✓ Solve numerical problems involving average velocity and

						instantaneous velocity. ✓ Define instantaneous acceleration. ✓ Solve problems involving average and instantaneous acceleration. ✓ Solve quantitative and qualitative kinematics problems related to average and instantaneous velocity and acceleration. ✓ Derive equations of motion for uniformly accelerated motion. ✓ Apply equations of uniformly accelerated motion in solving problems. ✓ Draw graphs from the kinematics equations. ✓ Interpret s–t, v–t and a–t graphs. ✓ Solve numerical kinematics problems. ✓ Relate scientific concepts to issues in everyday life. ✓ Explain the science of kinematics underlying familiar facts, observations and related phenomena.
	4	Dynamics	4.1 The force concept	20	4	Identify the four basic forces in nature.

			4.2 Basic laws of dynamics 4.3 Law of conservation of linear momentum and its applications 4.4 Elastic and inelastic collisions in one and two dimensions 4.5 Centre of mass 4.6 Momentum conservation in a variable mass system 4.7 Dynamics of uniform circular motion			• Define and describe the concepts and units related to force. • Define the term dynamics. • Define and describe the concepts and units related to coefficients of friction. • Use the laws of dynamics in solving problems. • Interpret Newton's laws and apply these to moving objects. • Explain the conditions associated with the movement of objects at constant velocity. • Solve dynamics problems involving friction. • State Newton's universal law of gravitation. • Analyse, in qualitative and quantitative terms, the various forces acting on an object in a variety of situations, and describe the resulting motion of the object. • Define, and when appropriate give examples of, such concepts as gravity and Newton's law of universal gravitation. • Describe how Newton's laws of motion and his law of universal gravitation • Explain the phenomenon of

						gravity and necessary conditions of 'weightlessness'..
	5	Work, energy and power	5.1 Work as a scalar product 5.2 Work done by a constant and variable force 5.3 Kinetic energy and the work-energy theorem 5.4 Potential energy 5.5 Conservation of energy 5.6 Conservation and dissipative forces 5.7 Power	13	2	Differentiate between energy, work and force. • Describe and explain the exchange among potential energy, kinetic energy and internal energy for simple mechanical systems, such as a pendulum, a roller coaster, a spring, a freely falling object. • Identify the relationship between work and change in kinetic energy. • Analyse and explain common situations involving work and energy, using the work–energy theorem. • Determine the energy stored in a spring. • Describe and explain the exchange among potential energy, kinetic energy and internal energy for simple mechanical systems, such as a pendulum, a roller coaster, a spring, a freely falling object. • Predict velocities, heights and spring compressions based on energy conservation. • Apply the law of mechanical energy

						conservation in daily life situations
	6	Rotational motion	6.1 Rotation about a fixed axis 6.2 Torque and angular acceleration 6.3 Rotational kinetic energy and rotational inertia 6.4 Rotational dynamics of a rigid body 6.5 Parallel axis theorem 6.6 Angular momentum and angular impulse 6.7 Conservation of angular momentum 6.8 Centre of mass of rigid body (circular ring, disc, rod and sphere)	17	3	Define and use the terms: angular displacement, angular velocity, angular acceleration, moment of inertia, angular momentum, angular impulse and torque • Use the equations for uniformly accelerated angular motion • Use the equations relating linear and angular motions • State the similarities and differences between the behavior of rotating bodies and bodies travelling with linear velocity • Identify the factors which determine the moment of inertia of a body • State and apply the law of conservation of angular momentum • Determine the velocity and acceleration of a point in the rotating body • Demonstrate the direction of angular velocity, angular acceleration and angular momentum using the right-hand rule
	7	Equilibrium	7.1 Equilibrium of a particle	10	2	✓ Find the resultant of two or more concurrent forces acting

			7.2 Moment of torque or force 7.3 Conditions of equilibrium 7.4 Couples			✓ at a point. ✓ Define the term equilibrium. ✓ State the first condition of equilibrium. ✓ Identify and label the forces and torques acting in problems related to equilibrium. ✓ Apply the first condition of equilibrium to solve equilibrium problems. ✓ Distinguish between coplanar and concurrent forces. ✓ Draw free body diagrams to show all the forces acting. ✓ Differentiate static equilibrium from dynamic equilibrium. ✓ State the second condition for equilibrium.
	8	Properties of bulk matter	8.1 Elastic behavior 8.2 Fluid statics 8.3 Fluid dynamics 8.4 Heat, temperature and thermal expansion	30	5	• Define the scientific terms: elastic limit, stress, strain, Young modulus, Shear modulus, viscous flow, viscosity, stream line flow, turbulent flow • Use equation of continuity to solve numerical problems • Describe the application of Bernoulli's principle in everyday life situation • State and use Bernoulli's equation to solve problems

						• Define surface tension and surface energy • Define the angle of contact and account for the shapes of liquid surfaces • Determine the relationship for the capillary rise and use it in problems • Define the terms: calorimetry, change of phase, latent heat, heat capacity, specific heat capacity • Distinguish between the concepts: heat, temperature, internal energy, work • Identify the units for heat, heat capacity, specific heat capacity, latent heat • Solve problems involving thermal conductivity, change of state and expansivity • Describe properties that can be used for temperature measurement • Explain the methods used for the measurement of specific heat capacities • Relate latent heat to intermolecular forces
	TOTAL			**136**	**24**	
Subject Physics GRADE 12 make up class						

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No	Unit	Content	Sub content	No of periods (at normal condition)	No of condensing periods	Objectives of the unit
	1	**Thermodynamics**	1.1 Thermal equilibrium and definition of temperature 1.2 Work, heat and the first law of thermodynamics 1.3 Kinetic theory of gases 1.4 Second law of thermodynamics, efficiency and entropy 1.5 Heat engines and refrigerators	15	3	• Acquire knowledge and understanding in the laws of thermodynamics, reversible and irreversible processes and heat engines. • Understand that the work done by a heat engine that is working in cycle is the difference between the heat flow into the engine at high temperature and the heat flow at a lower temperature. • Identify that the internal energy of an object includes the energy of random motion of the object's atoms and molecules. • Solve problems involving heat flow, work and efficiency in a heat engine and know that all real engines lose some heat to their surroundings. • Know that heat flow and work are two forms of energy transfer between systems. • Understand ideal – gas

						processes and represent them on a P.V. diagram, adiabatic processes, the properties of a macroscopic system in terms of the microscopic behaviour of molecules.
	2	**Oscillations and waves**	2.1 Periodic motion (basic concepts) 2.2 Wave motion 2.3 Sound, loudness and human ear	18	3	• Identify the characteristic properties of waves: interference (beats), diffraction, refraction, Doppler effect. • Demonstrate an understanding of the properties of mechanical waves and sound and the principles underlying the production, transmission, interaction, and reception of mechanical waves and sound. • Investigate the properties of mechanical waves and sound through experiments, and compare predicted results with actual results. • Describe and explain ways in which mechanical waves and sound are produced in nature, and evaluate the contributions to entertainment, health, and safety of technologies that make use of mechanical

						waves and sound.
	3	**Wave optics**	3.1 Wave fronts and Huygen's principle 3.2 Reflection and refraction of wave fronts 3.3 Proof of the laws of reflection and refraction using Hugen's principle 3.4 Interference 3.5 Young's double slit experiment and expression for fringe width 3.6 Coherent sources and sustained interference of light 3.7 Diffraction due to a single slit and a diffraction grating	10	2	• Recognise the limitations of geometric optics. • Define and explain units and concepts related to the wave nature of light. • Use laboratory materials in a prescribed manner when conducting lab investigations. • Explain the behaviour of light when light waves from coherent sources interact each other (interference). • Explain the behaviour of light when it interacts with material obstacles (diffraction). • Deduce the wave nature of light. • Explain experimental observations using the wave nature of light. • Demonstrate an understanding of the wave model of electromagnetic radiation, and describe how it explains diffraction patterns, interference and Huygens's principle. • Perform experiments relating the wave model of light and technical applications of

						electromagnetic radiation to the phenomena of refraction, diffraction, interference.. ✓ develop scientific attitudes and values.
	4	**Electrostatics**	4.1 Electric charge and Coulomb's law 4.2 Electric potential 4.3 Capacitors and dielectrics	14	3	• Know how to calculate the electric field resulting from a point charge.. • Understand static electric fields have as their source some arrangement of electric charges. . • Know how to apply the concepts of electrical potential energy to solve problems involving conservation of energy. • Acquire knowledge and understanding in electrostatic phenomenon.
Total				**57**	**11**	