GRADE 11(BILINGUAL) PHYSICS
FIRST SEMESTER

UNIT-1 MOTION AND DYNAMICS

Learning Outcomes

Candidates should be able to:

(a) Define displacement, speed, velocity and acceleration.
(b) Use graphical methods to represent displacement, speed, velocity and acceleration.
(c) Find displacement from the area under a velocity-time graph.
(d) Use the slope of a displacement-time graph to find the velocity.
(e) Use the slope of a velocity-time graph to find the acceleration.
(f) Derive, from the definitions of velocity and acceleration, equations which represent uniformly accelerated motion in a straight line.
(g) Solve problems using equations which represent uniformly accelerated motion in a straight line, including the motion of bodies falling in a uniform gravitational field without air resistance.
(h) Recall that the weight of a body is equal to the product of its mass and the acceleration of free fall.
(i) Describe an experiment to determine the acceleration of free fall using a falling body.
(j) Describe qualitatively the motion of bodies falling in a uniform gravitational field with air resistance.
(k) Represent a vector as two perpendicular components.
(l) Use vectors to represent force, velocity and acceleration.
(m) Analyse quantitatively the horizontal and vertical motion of a projectile.

UNIT-2 NEWTON'S LAWS OF MOTION

Learning Outcomes

Candidates should be able to:

(a) Describe the forces on mass in uniform gravitational field.
(b) State each of Newton's laws of motion.

(c) Show an understanding that mass is the property of a body which resists change in motion.
(d) Describe and use the concept of weight as the effect of a gravitational field on a mass.
(e) Recall and solve problems using the relationship F = ma, appreciating that acceleration and force are always in the same direction.
(f) Identify the frame of reference for a given motion.
(g) Apply Newton's laws of motion to explain inertia, the relationship between force, mass, and acceleration and the interaction of forces between two objects.
(h) Show an understanding of the concept of a gravitational field as an example field of force and define gravitational field strength as force per unit mass.
(i) Recall and use Newton's law of gravitation in the form $F=G(m_1m_2)$

UNIT-3 CONSERVATION OF MOMENTUM

Learning Outcomes

(a) Define linear momentum as the product of mass and velocity.
(b) Define force as rate of change of momentum.
(c) State the principle of conservation of momentum.
(d) Apply the principle of conservation of momentum to solve simple problems including elastic and inelastic interactions between two bodies in one dimension.
(e) Apply quantitively the laws of conservation of momentum to one and two dimensional collisions.
(f) Recognize that, for a perfectly elastic collision, the relative speed of approach is equal to the relative speed of separation.
(g) Show an understanding that, whilst momentum of a system is always conserved in interactions between bodies, some change in kinetic energy usually takes place.

UNIT-4 UNIFORM CIRCULAR MOTION

Learning Outcomes

Candidates should be able to:

(a) Express angular displacement in radians.
(b) Understand and use the concept of angular velocity to solve problems.
(c) Describe and explain motion due to a uniform velocity in one direction and a uniform acceleration in a perpendicular direction.
(d) Recall and use $v = r\omega$ to solve problems.
(e) Describe qualitatively motion in a curved path due to a perpendicular force, and understand the centripetal acceleration in the case of uniform motion in a circle.
(f) Recall and use centripetal acceleration $a = r\omega^2$, $a = v^2/r$.
(g) Recall and use centripetal force $F = m r\omega^2$, $F = mv^2/r$.

SECOND SEMESTER

UNIT-1 CONSERVATION OF ENERGY

Learning Outcomes

Candidates should be able to:

(a) Give examples of energy in different forms, its conversion and conservation, and apply the principle of energy conservation to simple examples.
(b) Show an understanding of the concept of work in terms of the product of a force and displacement in the direction of the force.
(c) Derive, from the equations of motion, the formula $E_k = \frac{1}{2}mv^2$.
(d) Recall and apply the formula $E_k = \frac{1}{2}mv^2$.
(e) Show an understanding and use the relationship between force and potential energy in a uniform field to solve problems.
(f) Recall and use the formula $E_p = mgh$ for potential energy changes near the Earth's surface.
(g) Derive, from the defining equation $W=Fs$, the formula $E_p=mgh$ for potential energy changes near the Earth's surface.

(h) Define power as work done per unit time and derive power as the product of force and velocity.
(i) Solve problems using the relationships power = work done per unit time and power = force × velocity.
(j) Determine the percent efficiency of energy transformations.

UNIT-2 LENSES

Learning Outcomes

Candidates should be able to:

(a) Explain the action of lens in term of refraction by a number of small prisms.
(b) Draw diagrams showing the effects of converging and diverging lenses on a beam of parallel rays.
(c) Recall the meaning of optical centre, principal axis, principal focus and focal length.
(d) Describe an experiment to measure the focal length of a converging lens.
(e) Draw ray diagram to show image formation by a converging lens.
(f) Draw scale diagram to solve problems on converging lenses.
(g) Recall the meaning of the term linear magnification.
(h) Recall the meaning of the term power of a lens.

UNIT- 3 PHOTOELECTRIC EFFECT

Learning Outcomes

Candidates should be able to:

(a) Show an appreciation of the particulate nature of electromagnetic radiation.
(b) Recall and use $E = hf$.
(c) Show an understanding that the photoelectric effect provides evidence for a particulate nature of electromagnetic radiation while phenomena such as interference and diffraction provide evidence for a wave nature.
(d) Recall the significance of threshold frequency.

(e) Explain photoelectric phenomena in terms of photon energy and work function energy.
(f) Explain why the maximum photoelectric energy is independent of intensity whereas the photoelectric current is proportional to intensity.
(g) Recall, use and explain the significance of $hf = \Phi + \frac{1}{2} mv^2$ max.
(h) Describe and interpret qualitatively the evidence provided by electron diffraction for the wave nature of particles.
(i) Recall and use the relation for the de Broglie wavelength $\lambda = h/p$.

UNIT- 4 NUCLEAR ENERGY

Learning Outcomes

Candidates should be able to:
(a) Infer from the results of the α-particle scattering experiment the existence and small size of the nucleus.
(b) Describe a simple model for the nuclear atom to include protons, neutrons and orbital electrons.
(c) Distinguish between nucleon number (mass number) and proton number (atomic number).
(d) Show an understanding that an element can exist in various isotopic forms each with a different number of neutrons.
(e) Use the usual notation for the representation of nuclides.
(f) Appreciate that nucleon number, proton number, and mass-energy are all conserved in nuclear processes.
(g) Represent simple nuclear reactions by nuclear equations of the form $^{14}_{7}N + ^{4}_{2}He \rightarrow ^{17}_{8}O + ^{1}_{1}H$.
(h) Show an appreciation of the spontaneous and random nature of nuclear decay.
(i) Show an understanding of the nature and properties of α-, β- and γ- radiations .
(j) Infer the random nature of radioactive decay from the fluctuations in count rate.
(k) Show an appreciation of the association between energy and mass as represented by $E = mc^2$ and recall and solve problems using this relationship.
(l) Sketch the variation of binding energy per nucleon with nucleon

number.

(m) Explain the relevance of binding energy per nucleon to nuclear fusion and to nuclear fission.

(n) Define the terms activity and decay constant and recall and solve problems using $A = \lambda N$.

(o) Infer and sketch the exponential nature of radioactive decay and solve problems using the relationship $x = x_o \exp(-\lambda t)$ where x could represent activity, number of undecayed particles or received count rate.

(p) Define half-life.

(q) Solve problems using the relation

$$\lambda = \frac{0.693}{t_{\frac{1}{2}}}.$$

PROPOSED PRACTICALS FOR GRADE 11(BILINGUAL) FIRST SEMESTER

S.NO.	UNIT NAME	PRACTICAL OBJECTIVE	REMARKS
1	MOTION AND DYNAMICS	1) TO STUDY THE MOTION A BALL ROLLING DOWN AN ANGLE IRON BY DRAWING A GRAPH BETWEEN S AND T^2.	Nelson Advanced Science: Physics Experimental Sheets. Second edition(Loose Leaf)
2	NEWTON'S LAWS OF MOTION	2)TO FIND THE UNKNOWN WEIGHT OF A BODY BY THE METHOD OF RECTANGULAR COMPONENT OF FORCES 3) DETERMINE THE VALUE OF g BY FREE FALL USING ELECTRONIC TIMER	Edexcel AS Physics, implementation and assessment, guide for teacher and technicians
3	CONSERVATION OF MOMENTUM	4)TO STUDY THE PRINCIPAL OF CONSERVATION OF MOMENTUM	Edexcel AS Physics , implementation and assessment, guide for teacher and technicians
4	UNIFORM CIRCULAR MOTION	5) TEST OF mv^2/r ON A TURN TABLE	

SECOND SEMESTER

S.NO.	UNIT NAME	PRACTICAL OBJECTIVE	REMARKS
1	CONSERVATION OF ENERGY	1)WORK DONE AND KINETIC ENERGY	DETAILS ARE ATTACHED
2	LENSES	2) DETERMINE THE FOCAL LENGTH OF CONVEX LENS BY DISPLACEMENT METHOD. 3) DETERMINE THE FOCAL LENGTH OF A CONCAVE LENS USING A CONVEX LENS 4) DETERMINE THE PROPERTIES OF IMAGE FORMED OF A BODY USING CONCAVE LENSES AT DIFFERENT POSITIONS. 5) DETERMINE THE PROPERTIES OF IMAGE FORMED OF A BODY USING CONVEX LENSES AT DIFFERENT POSITIONS.	DETAILS ARE ATTACHED
3	PHOTOELECTRIC EFFECT	5)LIGHT INTENSITY VARIATION WITH DISTANCE 6)TO ESTIMATE THE VALUE OF PLANCK'S CONSTANTS BY USING PHOTOCELL TUBE AND COLOURED LIGHT FILTERS	DETAILS ARE ATTACHED
4	NUCLEAR ENERGY		

HOD (SCIENCES)

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