# LEAVING CERTIFICATE EXAMINATION, 1982

## PHYSICS—ORDINARY LEVEL

## THURSDAY, 24 JUNE—MORNING, 9.30 to 12.30

Any **six** questions to be answered.
All the questions carry the same marks.

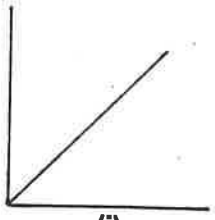
1. Answer *eleven* of the following items (*a*), (*b*), (*c*), etc. All the items carry the same marks. *Keep your answers short.*

(*a*) Define velocity.

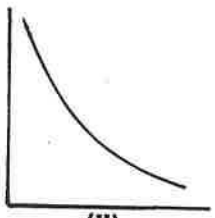
(*b*) Represent by means of a diagram the resultant displacement of 3 m in an easterly direction and 4 m in a northerly direction.

(*c*) Give an example of a body which is accelerating while it still moves at constant speed.

(*d*) Copy either graph (i) *or* graph (ii) and label the axes so that the graph represents Boyle's law.



(i)

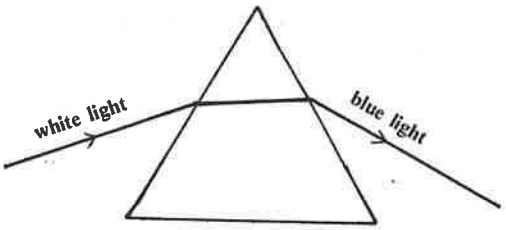


(ii)

(*e*) State Newton's law of gravitation.

(*f*) Calculate the potential energy of a body of mass 0·5 kg when raised to a height of 4 m. (Take $g = 9{\cdot}8\ ms^{-2}$)

(*g*) Copy the diagram shown and indicate the path of a ray of red light passing through and emerging from the prism.




(*h*) What is meant by total internal reflection?

(*i*) Explain what is meant by diffraction of waves.

(*j*) How many joules of energy in a kilowatt-hour?

(*k*) What is the average number of electrons per second passing a point in a circuit in which there is a current of 1 ampere? (Take the electron charge $= 1{\cdot}6 \times 10^{-19}$ C)

(*l*) Why are fuses used in electrical circuits?

(*m*) Define magnetic dip.

(*n*) State the basic principle underlying the operation of moving-coil meters.

(*o*) What is the nature of X-rays? Give one property of X-rays.

(*p*) Complete the nuclear reaction: ${}^{9}_{4}\mathrm{Be} + {}^{4}_{2}\mathrm{He} \rightarrow {}^{12}_{6}\mathrm{C} +$

2. Define (*a*) acceleration, (*b*) force.
A body of mass 2 kg moves with a velocity of 10 $ms^{-1}$. A constant force of 20 N is applied so as to bring the body to rest. Calculate (i) the deceleration (retardation) of the body, (ii) the distance moved by the body before it comes to rest, (iii) the work done to bring the body to rest.

3. Explain as simply as you can the distinction between heat and temperature.
Describe an experiment to show how the resistance of a wire varies with temperature. Explain how the results of this experiment could be used to measure temperature.
Name a type of electrical thermometer which is suitable for measuring a rapidly varying temperature.

4. Describe an experiment to demonstrate that $\frac{\sin i}{\sin r}$ = constant for a given pair of media where $i$ and $r$ represent the angles of incidence and refraction, respectively.
Show, by means of a ray-diagram, how (i) a real image, (ii) a virtual image, of an object is formed by a convex lens.
Indicate how the eye produces images of objects which may be at different distances from the eye.

5. Explain the basic physical principles involved in any *four* of the following.

(*a*) When the headlights of a car are switched off the light usually does not disappear instantly.

(*b*) Bright patterns of light are visible on the bottom of a pool of water in strong light where there are ripples on the water.

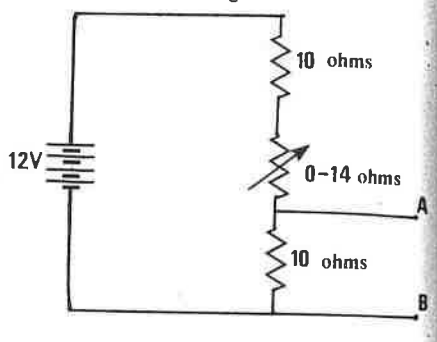
(*c*) On applying the brakes suddenly to a car travelling at speed the use of a safety belt reduces the risk of injury to a passenger.

(*d*) Frequently two metals corrode faster when in contact than when one metal only is present.

(*e*) Large amounts of energy may be obtained from small quantities of nuclear fuel.

6. (*a*) Define the unit of charge i.e. the coulomb.
Describe how you would demonstrate by experiment the force between electric charges.

(*b*) State Ohm's law.
The circuit shown consists of a battery of e.m.f. 12 V, with negligible internal resistance, connected to two fixed resistances each of value 10 ohms and a resistance which can be varied from zero to 14 ohms.
Calculate (i) the greatest, (ii) the least, potential difference between the points A and B.




7. Describe how you would perform any *two* of the following experiments in the laboratory:

(*a*) to measure the specific heat capacity of a metal,

(*b*) to measure the wavelength of monochromatic light e.g. sodium light,

(*c*) to show the variation of current with potential difference in the thermionic diode,

(*d*) to measure the velocity of sound in air.

8. What are (i) electrons, (ii) photons?
Describe an experiment to demonstrate the photoelectric effect.
What conclusion regarding the nature of light was drawn from this phenomenon?
Mention *one* application of the photoelectric effect.

9. Explain the terms: radioactive decay, half-life.
List the properties of alpha, beta, and gamma radiations.
Describe with the aid of a labelled diagram, the structure of a Geiger-Muller tube and explain how it may be used to detect the radiations from a radioactive substance.
If a radioactive substance has a half-life of 3 hours, what fraction of a given sample of this substance remains after 15 hours?

10. Answer any *two* of the following.

(*a*) List four assumptions of the kinetic theory of gases. Indicate how (i) pressure, (ii) temperature, may be explained qualitatively on the basis of the kinetic theory.

(*b*) What is meant by a standing (stationary) wave? How may such a wave be produced in the laboratory? Indicate the position of the nodes and of the antinodes.

(*c*) Explain the term: electromagnetic induction.
Describe, with the aid of a diagram, how a transformer *or* an induction coil functions.

(*d*) State Faraday's laws of electrolysis.
A plate of total surface area 100 $cm^2$ is to be plated with a layer of copper 2·5 mm in thickness. Calculate (i) the mass of copper required, (ii) the time taken to deposit the copper by means of a current of 2 A. (Take the density of copper = 8900 kg $m^{-3}$; the electrochemical equivalent of copper = $3{\cdot}0 \times 10^{-7}$ kg $C^{-1}$).