

## AN ROINN OIDEACHAIS

## LEAVING CERTIFICATE EXAMINATION, 1980

## PHYSICS—ORDINARY LEVEL

WEDNESDAY, 25 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) What is the weight in newtons of a girl whose mass is 50 kg? (Take  $g = 9.8 \text{ m s}^{-2}$ ).  
 (c) If a ray of light makes an angle of incidence of  $45^\circ$  at a plane mirror, what is the angle of reflection?  
 (d) Explain the term diffraction.  
 (e) What is meant by the amplitude of a wave?  
 (f) Complete the statement: For a given mass of gas, the pressure multiplied by the ..... is constant if the ..... remains constant.  
 (g) Name the charge carriers in (i) a metal, (ii) an electrolyte.  
 (h) How does the force exerted by one charge on an equal charge vary with the distance between them?  
 (i) A positively charged rod (L) is brought close to two metal spheres (A and B) which are in contact. (See Fig. 1) The charged rod is removed *after* the spheres have been separated.  
 What will be the nature of the charges (if any) on each of the spheres?  
 (j) An alternating voltage of 250 V is applied to a transformer which has 400 turns in the primary coil. If the voltage induced in the secondary coil is 50 volts, how many turns are there in the secondary coil?  
 (k) A shunt is used to convert a galvanometer to an ammeter. Should the value of the resistance of this shunt be (i) equal to, (ii) much smaller than, (iii) much larger than, the resistance of the galvanometer?

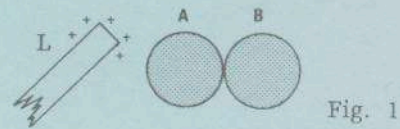
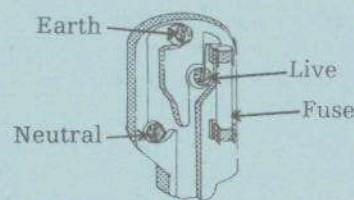
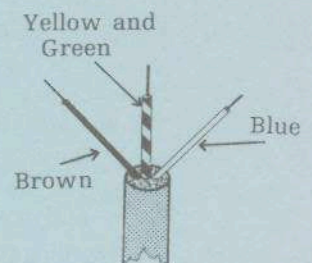


Fig. 1

- (l) In Fig. 2, part (a) illustrates the connecting points on the inside of a 13A plug, while part (b) indicates the colour of the insulation on each of the wires in a cable used to connect an appliance to the mains supply. With regard to each of the wires state which point of the plug it should be connected to so as to ensure safe operation of the appliance.



(a)



(b)

Fig. 2

- (m) What is the photoelectric effect?  
 (n) Give two uses of X-rays.  
 (o) Arrange the following radiations in order of increasing penetrating ability: (i)  $\beta$ -particles, (ii)  $\alpha$ -particles, (iii)  $\gamma$ -rays.  
 (p) What are neutrons?
2. (a) What is (i) a scalar quantity, (ii) a vector quantity?  
 Two forces of 6 N and 8 N act at right angles to each other. Calculate the magnitude of the resultant.  
 (b) Describe an experiment to measure  $g$ , the acceleration due to gravity.  
 The value of  $g$  on the earth's surface is  $9.8 \text{ m s}^{-2}$ . Calculate the value of  $g$  at a point 600 km from the earth's surface. (Take radius of the earth =  $6.4 \times 10^6 \text{ m}$ .)

3. (a) What is meant by specific heat capacity?  
Describe an experiment to measure the specific heat capacity of copper *or* water.
- (b) Describe, with the aid of a labelled diagram, an electrical resistance thermometer and show how the thermometer may be used to measure temperature.
4. (a) Draw a ray diagram to show how an image is formed in a convex mirror. Describe how the position of this image may be determined experimentally.
- (b) Describe an experiment to measure the refractive index of glass *or* water.  
If the critical angle for glass is  $42^\circ$ , calculate the refractive index of glass.
5. Explain the basic physical principles involved in any *four* of the following.
- (a) Sounds are usually more easily heard on a cold night than on a warm day.
- (b) Fluorescent lamps produce more light than filament lamps of the same power.
- (c) A rocket changes its velocity by expelling a gas.
- (d) When removing a nylon shirt a 'crackling' sound is often heard.
- (e) When a fast-moving car is brought to rest by braking, the brakes become hot.
6. (a) What is meant by the electromotive force (e.m.f.) of a cell?  
Describe the essential features of a simple cell. Explain why the light from a bulb, connected to the cell, gradually becomes dim.
- (b) State the laws of electromagnetic induction and describe how *one* of these laws may be demonstrated by experiment.
7. Describe how you would perform any *two* of the following experiments in the laboratory:
- (a) to measure the speed of sound in air;
- (b) to obtain an estimate of Avogadro's number;
- (c) to measure the electrochemical equivalent of copper;
- (d) to measure the wavelength of sodium light.
8. What is thermionic emission?  
Draw a labelled diagram of a thermionic diode and describe an experiment to determine the relationship between the current flowing through it and the potential difference between its plates.  
What happens when an alternating voltage is applied across a thermionic diode?
9. Explain the terms: radioactivity; half-life.  
Describe experiments, one in each case, to show that (i)  $\beta$ -particles are negatively charged, (ii)  $\alpha$ -particles cause ionisation.  
Give a brief account of nuclear fission. How may the energy released in this process be converted into electricity?
10. Answer any *two* of the following.
- (a) Define the terms: (i) acceleration, (ii) force.  
A car of mass 800 kg is travelling with a speed of  $30 \text{ m s}^{-1}$  when the brakes are applied. If the car comes to rest in a distance of 100 m, find its retardation (deceleration). Calculate the force required to produce this retardation.
- (b) Use a ray diagram to show how the final image is formed in a compound microscope.  
A simple microscope consists of a convex lens of focal length 10 cm. If the lens is placed 5 cm from an object, find the position and magnification of the image.
- (c) What is meant by capacitance?  
Describe an experiment to show that the capacitance of a parallel plate capacitor depends on (i) the area of the plates, (ii) the distance between the plates.
- (d) Describe an experiment to show that a current-carrying conductor in a magnetic field experiences a force. What are the factors which determine the magnitude of this force?