

LEAVING CERTIFICATE EXAMINATION, 1972

PHYSICS - ORDINARY LEVEL

FRIDAY, 16th JUNE - MORNING, 9.30 to 12

Any six questions to be answered

1. Answer eleven of the following sixteen items (a), (b), (c) ... etc. Each item carries six marks. Keep your answers short.

- (a) How is the period of a simple pendulum affected when the length is increased ?
 (b) List the forms of energy involved when electricity is generated by burning oil.
 (c) Two forces act at right angles to each other. Draw a diagram to show their resultant.
 (d) How is it that an astronaut experiences weightlessness when in orbit around the earth ?
 (e) Why do the hairs of a clean paint brush cling together after it has been dipped into water ?

- (f) The graph (Fig. I) shows the volume of a given mass of gas at 0°C and at 100°C , the pressure being constant. What temperature does A represent ?

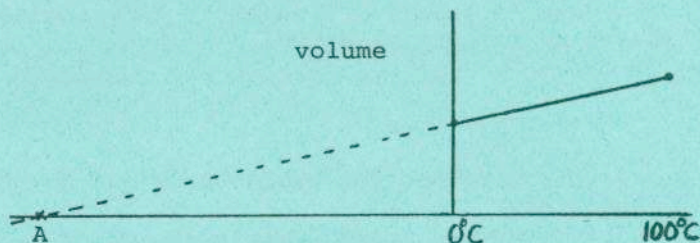


Fig. I

- (g) "Evaporation is accompanied by cooling". Explain this in terms of the energy of the molecules.
 (h) Write down one of the laws of reflection of light.

- (i) What are the distances A and B called in the wave form in Fig. II ?

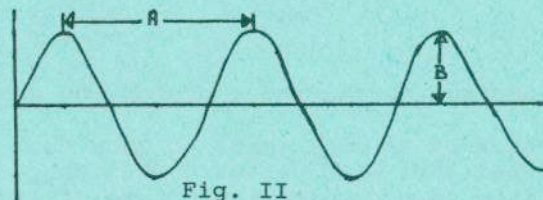


Fig. II

- (j) Which of the following has the longest wavelength: visible light, ultra-violet, infra-red, gamma rays, X-rays ?
 (k) Complete the statement: In electrolysis the current is carried by — .
 (l) For what purpose is a transformer used ?
 (m) Mention one use of a thermionic diode.
 (n) A bulb is marked 60 watt, 240 volt. What current flows in the bulb when it is connected to a 240 volt supply ?

- (o) What is the effective resistance of the two resistors in Fig. III ?

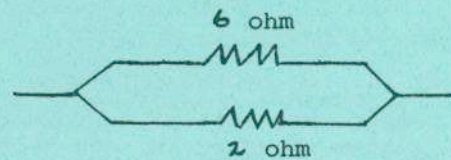


Fig. III

- (p) What is meant by saying that the half-life of radioactive cobalt is 5 years ?
 (66 marks)

2. State Newton's laws of motion.
 A car starts from rest and travels 100 metres in 20 seconds with uniform acceleration. Find its velocity at the end of the 20 seconds.
 If the mass of the car is 750 kg (750,000 grams), what constant retarding force would bring the car to rest in 2.5 seconds, and how far would the car travel in that time ?
 (66 marks)

3. Indicate how you would measure temperature using a resistance thermometer.
 The gas thermometer is generally used as a standard thermometer whereas electrical thermometers are more usually used in practice. Account for this.
 A platinum resistance thermometer has a resistance of 4.0 ohms at 0°C and a resistance of 4.5 ohms at 100°C . What would the thermometer read in $^{\circ}\text{C}$ when the resistance is 4.3 ohms ?
 (66 marks)

4. Explain the basic physical principles involved in each of the following.

- (a) When a bullet is fired from a gun the gun recoils.
- (b) Polaroid reduces the amount of light, reflected from a surface, which reaches the eye.
- (c) When electrical energy is being transmitted over long distances it is transmitted at high voltage.
- (d) In a television set the neck of the cathode ray tube is surrounded by a soft iron cylinder.

(66 marks)

5. Use ray diagrams to show the passage of a beam of light, parallel to the axis, through (i) a convex lens, (ii) a concave lens.

How would you measure the focal length of a convex lens ?

An object is placed on the axis of a convex lens, and an image three times the size of the object is formed on a screen 30 cm from the lens. Calculate the focal length of the lens.

(66 marks)

6. Describe an experiment (a) to show electromagnetic induction, (b) to show that a current-carrying conductor experiences a force in a magnetic field.

Draw a labelled diagram of a moving-coil meter or a dynamo and show how its operation is based on (a) or (b) above.

(66 marks)

7. Describe how you would carry out any two of the following experiments in the laboratory:

- (i) to measure the velocity of sound in air,
- (ii) to measure the refractive index of water,
- (iii) to measure the horizontal component of the earth's magnetic field,
- (iv) to compare the electromotive force (e.m.f.) of two cells.

(67 marks)

8. Compare the electron, proton and neutron in terms of charge, mass and position in the atom.

Describe an experiment to show that electrons are emitted from the surface of metals when irradiated with ultraviolet light. Explain this effect and say what conclusion was drawn from it regarding the nature of light.

(67 marks)

9. What is meant by (i) natural radioactivity, (ii) artificial (induced) radioactivity ?

How may radioactive isotopes be produced ? What is the nature of each type of radiation emitted from radioactive isotopes ?

Explain the terms: nuclear fission, nuclear fusion. In what respect do these processes resemble each other ?

(67 marks)

10. Answer any two of the following.

(a) Compare the optical systems of the eye and the camera. In what way is the lens system adjusted in each so that a well defined image of the object is always obtained ?

(b) What is meant by the capacitance (capacity) of a capacitor ?

A capacitor consists of two parallel plates, one plate is earthed and the other plate is connected to a charged electroscope. State what happens to the potential and hence the capacitance when (i) a block of wax is placed between the plates (ii) the distance between the plates is increased.

(c) Outline the production and properties of X-rays.

(d) What is meant by the interference of waves ?

Describe an experiment to demonstrate interference.

(67 marks)