

## AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION, 1965

PHYSICS — PASS

THURSDAY, 24th JUNE — Afternoon, 3 to 5.30

Not more than six questions to be attempted.(Take  $g = 9.8$  metres per sec<sup>2</sup> or  
980 cm. per sec<sup>2</sup>.)

1. Define (i) acceleration, (ii) kinetic energy.

A body of mass 40 kgm., resting on a smooth horizontal plane, is acted upon by a horizontal force of 2 kgm. wt. Find (a) the acceleration attained, (b) the distance travelled in 10 secs. Find, also, the kinetic energy of the body after 10 secs.

(66 marks)

2. State Newton's law of gravitation.

Calculate the mass of the earth, given that the radius of the earth (assumed spherical) is  $6.4 \times 10^6$  metres.

(Assume  $G = 6.7 \times 10^{-11}$  M.K.S. units or  $6.7 \times 10^{-8}$  C.G.S. units.)

(66 marks)

3. (a) Deduce any
- one
- of the gas laws from the

$$\text{kinetic theory equation } p = \frac{1}{3} \frac{nm\bar{c}^2}{V}$$

where  $p$  is the pressure of a gas in dynes per sq. cm.,  $n$  is the number of molecules in  $V$  c.c. of the gas,  $m$  is the mass of a molecule in grams and  $\bar{c}^2$  is the mean-square velocity of the molecules in cm. per sec.

- (b) Describe a method of measuring the specific heat of a given metal.

(66 marks)

4. Name two types of wave motion. In what respect do they differ from each other?

Explain the terms: wavelength, frequency, velocity, and state the relation between them.

Give an account of a laboratory method of measuring the velocity of sound in air.

(66 marks)

or

4. State the laws of refraction of light and describe an experiment to illustrate
- one
- of them.

Explain the terms: critical angle, total internal reflection.

Show, by means of diagrams, how a right-angled isosceles glass prism may turn a ray of light through (i)  $90^\circ$ , (ii)  $180^\circ$ .

(66 marks)

5. Explain what is meant by (i) interference, (ii) diffraction, of light.

Describe a method of measuring the wavelength of sodium light.

(66 marks)

or

5. Show, by means of ray-diagrams, how (i) a real diminished image, (ii) a real magnified image, (iii) a virtual image, of an object may be formed by a concave mirror.

At what distance from a concave mirror of focal length 12 cm. should an object be placed so as to form a virtual image three times the size of the object?

(66 marks)

6. State the chief properties of the electron. Describe, with the aid of a diagram, how electrons are produced in (i) a cathode-ray tube, (ii) a photoelectric cell.

(66 marks)

or

6. Describe, with the aid of a diagram, a gold-leaf electroscope and show how it may be used to examine the nature of the charge on a charged conductor.

Give an account of how you would charge an electroscope positively by induction.

(66 marks)

7. Describe a simple experiment to demonstrate that a conductor carrying a current experiences a force when placed in a magnetic field.

Draw a labelled diagram of a moving-coil ammeter and explain the function of each of its various parts.

Given a moving-coil ammeter show how it may be adapted to function as a voltmeter. (67 marks)

8. State Ohm's law. Discuss the law with reference to electrolytes.

Describe how you would measure the resistance of a piece of wire or the internal resistance of a cell.

(67 marks)

9. Write a note on the structure of the nucleus. What are isotopes?

Give an account of radioactivity under the following headings:-

(i) natural radioactivity, (ii) artificial radioactivity, (iii) radioactive decay. (67 marks)

or

9. Explain what is meant by (i) magnetic field, (ii) magnetic line of force.

Draw a diagram of the resultant field due to a bar magnet when placed horizontally in the earth's magnetic field with its axis in the magnetic meridian and its north-seeking pole pointing south. Indicate the positions of the null points.

Outline a method of comparing the horizontal components of the earth's magnetic field intensity at any two places. (67 marks)

10. State the laws of electromagnetic induction. Describe the construction of a simple direct current dynamo and explain how its working depends on these laws.

What changes should be made in the dynamo in order to produce an alternating current?

(67 marks)

or

10. Write brief notes on any
- two
- of the following: (i) Brownian movement, (ii) the solar spectrum, (iii) the laws associated with the heating effect of an electric current, (iv) X-rays.

(67 marks)