

AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION, 1966

PHYSICS - PASS

WEDNESDAY, JUNE 15 - Morning, 10 to 12.30

Not more than six questions to be attempted.

1. Define force, mass, acceleration and state the relation between them.

A car, of mass 2,000 lb. travelling at 30 m.p.h. along a straight horizontal road, is brought to rest in a distance of 55 ft. by a constant retarding force. Calculate (i) the time taken by the car to come to rest, (ii) the retarding force in lb. wt.

(66 marks)

2. Describe a laboratory method of measuring the acceleration due to gravity, g .

State Newton's law of gravitation. What is the connection between the acceleration due to gravity, g , and the gravitational constant, G ?

(66 marks)

3. Define (i) calorie, (ii) joule or erg.

Describe an experiment to measure the mechanical equivalent of heat.

If water falls through a vertical height of 600 metres calculate the consequent rise in the temperature of the water, assuming that all the energy of the water is converted into heat.

(Take $J = 4.2$ joules per calorie or 4.2×10^7 ergs per calorie; $g = 9.8$ metres per sec². or 980 cm. per sec².)

(66 marks)

OR

3. In the case of a definite mass of gas state the relation between (i) pressure and volume at constant temperature, (ii) volume and temperature at constant pressure, (iii) pressure, volume and temperature.

What are the basic assumptions of the kinetic theory of gases? Given the kinetic theory equation $p = \frac{1}{3} n m \bar{c}^2$ (where p = the pressure of a gas, n = the number of molecules per unit volume of the gas, m = the mass of a molecule, \bar{c}^2 = the mean square velocity of the molecules), deduce the relation in (i) above.

(66 marks)

4. (a) Define refractive index.

Describe an experiment to measure the refractive index of the glass in a transparent rectangular glass block.

(b) Outline, with the aid of a diagram of the optical arrangement, a method of producing a pure spectrum of white light.

(66 marks)

OR

4. With regard to light explain the following terms: transverse waves, wavelength, interference, diffraction.

Describe an experiment to measure the wavelength of sodium light.

(66 marks)

5. Give an account of a method of measuring the focal length of a convex lens.

Describe a simple telescope and show by means of a ray-diagram how the final image is formed.

(66 marks)

6. Give an account of the nature and properties of alpha, beta and gamma radiations.

State how radioactive isotopes are produced and mention any two of their applications.

(66 marks)

OR

6. (a) Show how you would investigate the distribution of charge over the surface of a charged conductor. Comment on the distribution of charge on (i) a spherical conductor, (ii) a pear-shaped conductor.

(b) Describe any form of condenser and state what is meant by its capacitance (capacity). Mention the factors on which the capacitance of a condenser depends.

(66 marks)

7. Draw labelled diagrams to illustrate the construction of (i) a moving-coil galvanometer, (ii) a dynamo which produces alternating current. Explain fully the principle on which one or other of them is based.

(67 marks)

8. Give an account of the photoelectric effect. What deduction may be drawn from it regarding the nature of light?

Describe a photoelectric cell and mention any one of its applications.

(67 marks)

OR

8. What is meant by the electromotive force (E.M.F.) of a cell?

Describe a method for comparing the E.M.F. of two cells.

Two cells, in series, each of E.M.F. 1.5 volts and each of internal resistance 1 ohm are connected with a coil of 2 ohms resistance. Calculate the current through the coil.

(67 marks)

9. Explain the terms: electrolyte, ion, electrochemical equivalent of an element.

When an electric current of 1 amp is passed for 30 minutes through a solution of copper sulphate using copper electrodes 0.54 gm. of copper is deposited. Calculate the electrochemical equivalent of copper.

Give a brief account of what happens when acidulated water is electrolysed using platinum electrodes.

(67 marks)

10. Write brief notes on any two of the following:-

- (i) the structure of the atom,
- (ii) the production and principal properties of X-rays,
- (iii) the nature and transmission of sound,
- (iv) the earth's magnetism.

(67 marks)