AN ROINN OIDEACHAIS.

(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1954.

PHYSICS.—PASS.

MONDAY, 21st JUNE.—MORNING 10 TO 12.

Not more than six questions to be answered.

One question, at least, must be answered from each section.

SECTION I.

1. State Boyle's law and describe how the truth of the law may be tested by experiment for pressures above and for pressures below atmospheric pressure.

A given mass of air at room temperature and at a pressure of one atmosphere occupies 200 c.c. Find the volume of the mass of air at a pressure of $2\frac{1}{2}$ atmospheres, the temperature remaining constant.

[66 marks.]

2. Two forces meet at a point. Tell how to find their resultant in magnitude and direction when their lines of action make an angle of $x°$ with each other. For what value of x would the resultant be (i) a maximum, (ii) a minimum ?

A light inextensible string is tied to the ends of a uniform rod weighing 12 lb. and passes over a smooth nail so that the rod hangs freely. If the two parts of the string make an angle of 60° with each other, find the tension in the string.

[66 marks.]

3. Explain what is meant by (i) moment of a force about a point, (ii) centre of gravity.

A thin flat sheet of metal is irregular in shape. Describe how to find its centre of gravity by experiment.

A thin sheet of metal ABCDE is so shaped that ABC is in the form of an equilateral triangle, and ACDE is in the form of a square. If ED is 4 inches long, find the distance of the centre of gravity of the sheet from ED.

[67 marks.]

SECTION II.

4. State the laws of reflection of light and describe how one of them may be tested by experiment.

Two plane mirrors are at right angles to one another and a pin stands in front of them. Draw a diagram to show the paths of the rays by which the eye sees each of the images.

[66 marks.]

5. Describe how to find by experiment the focal leng h of a concave mirror.

A pin stands vertically on the axis of a concave mirror. State the nature of the image and compare its size with that of the pin, when the pin is, (i) beyond the centre of curvature, (ii) at the centre of curvature, (iii) between the centre of curvature and the focus, (iv) between the focus and the pole.

Illustrate your answer by means of diagrams in (i) and in (iv).

[66 marks.]

6. Describe how you would compare the illuminating powers of two sources of light.

A candle and a lamp when placed at distances of 2 feet and 5 feet, respectively, from a surface produce the same intensity of illumination on the surface. Compare the illuminating powers of the candle and the lamp.

[67 marks.]

Section III.

7. Mention the properties of a bar magnet.

What is meant by (i) magnetic meridian, (ii) declination ?

Describe how a bar magnet may be used to find the direction of the magnetic meridian at a given place and give an account of the further work that should be done to measure the declination.

[66 marks.]

8. Describe how an insulated conductor may be charged negatively.

A, B and C are three insulated spherical conductors. A is negatively charged and B and C are uncharged. If B is brought near A, how is the induced charge on B distributed ? If, in the presence of A, C is allowed to touch B and is then separated from B, how are the charges on B and C, respectively, affected ?

[66 marks.]

9. Describe a tangent galvanometer.

Tell how the tangent galvanometer may be used to compare (*a*) the magnitudes of the currents flowing in two circuits, and, also, (*b*) the electromotive forces of two cells.

[67 marks.]

10. State the laws relating to the development of heat in a conductor in which an electric current flows.

A current of 2 amps. flows through a wire of 12 ohms resistance. If the wire is placed in 600 c.c. of water, find the rise in temperature of the water after 15 minutes, assuming that all the heat generated is used in heating the water.

[1 joule=0·24 calorie].

[67 marks.]