AN ROINN OIDEACHAIS

(Department of Education).

BRAINNSE AN MHEÁN-OIDEACHAIS

(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1934.

FULL COURSE.

PHYSICS.

THURSDAY, 21st JUNE.—Afternoon, 1.30 to 3.30 P.M.

Not more than *six* questions may be attempted.

All questions are of equal value.

1. State the laws of refraction of light. Explain the terms 'total reflexion' and 'critical angle.' State the connexion between the critical angle and the refractive index. Prove your statement.

2. A compound lens consists of a convex lens of focal length 30 cms. and a concave lens of focal length 20 cms. An object 2 cms. high is placed 40 cms. from the compound lens. Find the position and size of the image. Illustrate your work by a diagram.

3. Give a full description of the optical system of a compound microscope or of a projection lantern.

4. Describe how the acceleration due to gravity may be determined by means of Atwood's machine.

5. A cyclist works at the rate of $\frac{1}{10}$ H.P. and goes 12 miles per hour on the level. The mass of the machine and its rider is 12 stone. Prove that up an incline of 1 in 50, the speed will be 5·8 miles per hour.

1 H.P. = 550 foot-lb. per sec.

6. State the principle of the conservation of energy. Illustrate the principle by showing how four of the following types of energy can be transformed: kinetic, potential, heat, strain, light, electric, magnetic and chemical. How are such transformations illustrated in the case of a hydro-electric installation such as the Shannon Scheme?

7. Explain the occurrence of neutral points near a bar magnet which lies on a horizontal table. Indicate on diagrams the positions in which you would expect to find these points, when the axis of the magnet is made to point north, south, east and west in turn.

8. Explain the principle and construction of the tangent galvanometer. A current flowing through a tangent galvanometer, which has 20 turns of wire in a coil of radius 6 cms. produces a deflexion of 45°. The horizontal controlling field parallel to the plane of the coil is 0·18 dyne per unit pole. Calculate the value of the current.

9. Describe the construction of a moving coil galvanometer and explain the theory of its action. How can it be adapted for use as (a) a voltmeter and (b) an ammeter?

10. Describe the construction of a dynamo for generating a steady direct current and explain the fundamental principle involved.