AN ROINN OIDEACHAIS
(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1942.

PHYSICS.—PASS.

FRIDAY, 19th JUNE.—AFTERNOON, 1.30 TO 3.30.

Candidates must answer one question at least out of each Section, and not more than *six* questions in all.

All questions are of equal value.

SECTION I.

1. State the relation between the radius of curvature and the focal length of a concave mirror.

How may the radius of curvature of a concave mirror be determined experimentally ?

An object is placed on the axis of a concave mirror of focal length 15 cms., the object being 40 c.m. from the pole of the mirror. Find the position and nature of the image.

2. Describe a method by which the velocity of light has been determined.

3. Show by diagrams how a convex lens forms (*a*) real, and (*b*) virtual images.

Describe any method for finding the focal length of a convex lens.

4. Describe the astronomical telescope and draw a diagram to show the paths of the rays which enable one to see the image of a point on a distant object.

SECTION II.

5. What is meant by the mechanical equivalent of heat (Joule's equivalent) and how may it be determined experimentally ?

A mass of 20 kilograms falls vertically and acquires sufficient energy to melt 10 grams of ice at 0° C. Given that the latent heat of fusion of ice is 80, find the height through which the mass falls.

[Acceleration due to gravity=981 cm./sec.^{2} Joule's mechanical equivalent=$4{\cdot}18\times10^7$ ergs/calorie.]

6. Prove the formula $s=ut+\frac{1}{2}ft^2$ for motion in a straight line with constant acceleration.

A particle falls from the top of a tower and strikes the ground after 4 secs. Find (*a*) the height of the tower, (*b*) the velocity of the particle just before it strikes the ground.

7. Define Potential energy and Kinetic energy. State the principle of the conservation of energy.

If a body slides down a smooth inclined plane show that the sum of its potential and kinetic energies remains constant throughout the motion.

8. What do you understand by power ?

A mass of 3 tons is raised through 90 ft. in 2 minutes. Find the work done and the horse power required.

SECTION III.

9. Describe the magnetometer.

Explain how a magnetometer may be used to compare the magnetic moments of two magnets.

A bar magnet lies on a horizontal plane with its north pole pointing south. Draw a diagram of the lines of force near the bar magnet.

10. State Ohm's Law.

Two coils of 2 ohms and 3 ohms resistance respectively are joined to the terminals of a battery which consists of four cells in series. Each cell has an E.M.F. of 1·5 volts and an internal resistance of 2 ohms. Calculate the current when the coils are joined in series.

11. Describe any type of electric cell, making special reference to the chemical reactions which take place when the cell is working.

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

12. Describe the construction of an electromagnet.

Explain the working of a dynamo, *or* of an electric bell.