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(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1943.

PHYSICS.—PASS.

SATURDAY, 19*th 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. What is meant by " Specific Gravity " ?

Describe how you would determine the specific gravity of a liquid.

A piece of zinc weighs 42 grammes in air, and its apparent weight in oil is 37·8 grammes. The specific gravity of the oil is 0·7.

Calculate from these results the specific gravity of the zinc.

2. From a point 75 feet above the ground, a stone is projected *vertically* upwards with a velocity of 64 feet per second.

Calculate (*a*) its greatest height above the ground, (*b*) its velocity on striking the ground, (*c*) the time it takes to reach the ground.

3. A train travels at a uniform speed of 60 miles per hour when the engine is working at full power. The weight of the train, including its engine, is 150 tons, and the total force resisting the train's motion is 10 lbs. weight per ton.

Write down the momentum and energy of the train and calculate the horse power of the engine.

Section II.

4. State (i) Boyle's Law, (ii) Charles's Law. Describe an experiment to verify one of these laws.

A mass of oxygen at N.T.P. occupies 300 c.c. Calculate the volume at a temperature of 27° C. and under a pressure of 600 mm.

5. Describe any form of photometer, and tell how you would use it to compare the illuminating powers of two lamps.

Illustrate your answer by means of a numerical example, assuming that the lamps have different illuminating powers.

6. Find a formula for the focal length of a concave mirror.

Describe how the focal length of a concave mirror may be found by a parallax method. The focal length of a concave mirror is 20 cm. An object is placed on the axis of the mirror at a distance of 15 cm. from the pole. Find the position and the nature of the image.

7. State the laws of refraction of light. How would you determine the index of refraction of water experimentally ?

What is meant by the critical angle ?

SECTION III.

8. What is meant by (a) " dip ", (b) " deviation ", (c) " horizontal intensity " of the earth's magnetic field ?

Describe how any one of these quantities say be determined experimentally.

9. Describe the construction and principle of the electromagnet.

Describe any apparatus of which an electromagnet forms a part and explain how it works.

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

When a current of 1 amp. is passed through a coil of wire immersed in 100 grams of water, the temperature of the water is raised 10°C in 2 minutes.

Calculate the resistance of the coil.

[1 calorie = 42 million ergs.]

11. State Ohm's Law.

What is the resistance of a 220 volt, 40 watt lamp ?

Three resistances of 60 ohms. each are arranged (a) in series, (b) in parallel. Calculate the total resistance in each case.