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(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1947.

PHYSICS.—PASS.

SATURDAY, 14*th JUNE.*—MORNING, 10 TO 12.

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. Describe two distinct types of barometer mentioning the advantages of each. Explain how a portable barometer may be used to find a rough value for the height of a mountain.

2. Define " density." A density bottle weighs 20 grams when empty, and 70 grams when filled with water at room temperature. Thirty-three grams of lead shot are placed in the empty bottle, and the bottle is then filled up with water. Find the weight of the whole. [Specific gravity of lead=11.)

3. Explain how you would use a simple pendulum to determine the acceleration of gravity, explaining what precautions you would take in order to obtain an accurate result.

4. What is meant by " mechanical equivalent of heat ? " An oil engine consumes $0 \cdot 5$ lb. of oil per horse-power hour. The heat of combustion of oil is 2×10^4 B.Th.U. per lb. What fraction of the available energy is converted into work by the engine ?
$J = 778$ ft. lbs./B.Th.U.   Horse-power$=550$ ft. lbs./sec.

SECTION II.

5. Define—" luminous intensity " of a source of light, and " intensity of illumination," on a surface. State the units in terms of which these quantities may be measured. Explain how you would compare the luminous intensities of two electric lamps.

6. Define " specific heat," " latent heat."

A copper vessel, weighing 100 grams, contains 50 grams of ice floating in 100 grams of ice-cold water. Water at 50° C. is added until the temperature of the calorimeter and its contents reaches 25° C. How much water must be added ?

Latent heat of fusion of ice = 80 calories/gram. Specific heat of copper = 0·1.

7. Explain the meaning of " critical angle," " total internal reflection."

A right-angled isosceles prism is made of glass having an index of refraction of $\sqrt{2}$. A ray of light falls perpendicularly (a) on one of the equal faces ; (b) on the hypotenuse. Draw the subsequent path of the light for each case.

8. Draw a sketch of an arrangement suitable for producing a pure spectrum on a screen. What are the characteristics of the spectra of the light emitted from the following, (a) an electric arc-lamp ; (b) the sun ; (c) a sodium flame ?

SECTION III.

9. A short bar-magnet is placed horizontally with its axis in the plane of the magnetic meridian, and with its South pole facing North. Explain how you would map the resultant magnetic field. Draw a diagram of the map you would expect to obtain, and explain how you would use it to find the magnetic moment of the magnet, being given the value of the horizontal component of the earth's magnetic field.

10. Describe any experiment by means of which you might compare the electromotive forces of two cells.

11. A steady current of electricity is passed through a hydrogen voltameter for 10 minutes. 100 cc. of dry hydrogen measured at 740 mm. of mercury and 15° C. are liberated. Calculate the current in amperes.

Electro-chemical equivalent of hydrogen = $1·05 \times 10^{-5}$ gm./coulomb. 2 gm. of hydrogen occupy 22·3 litres at S.T.P.

12. Describe a simple type of dynamo and explain how it works.