

AN ROINN OIDEACHAIS.
(DEPARTMENT OF EDUCATION)

AN BRAINSE GAIRM-OIDEACHAIS.
(TECHNICAL INSTRUCTION BRANCH.)

CERTIFICATE EXAMINATIONS

for

DAY VOCATIONAL COURSES, 1954.

MAGNETISM AND ELECTRICITY.

Friday, June 18th—10 to 12 noon.

Instructions.

Not more than *five* questions to be attempted.

All the questions carry equal marks.

1. State the law of attraction and repulsion between magnetic poles.

Give diagrams of the magnetic fields between two poles placed a short distance apart to show

- (a) Attraction between the poles.
- (b) Repulsion between the poles.

Mark the polarity of each pole, and the direction of the magnetic field in each case.

2. What do you understand by "polarisation" in a simple voltaic cell?

Describe, with a diagram, the construction of a Leclanche wet cell *or* any dry battery, and state how polarisation is overcome in the cell.

[P.T.O.]

3. Define (a) an electrical unit of power.
(b) an electrical unit of energy.

If a resistance of 50 ohms is connected to a 200 volt supply for 6 minutes, calculate

- (i) the current supplied,
(ii) the quantity of electricity supplied,
(iii) the energy supplied.

4. An electric kettle has a heating element rated at 500 watts. Calculate the weight of water in grams that the kettle would heat from 15°C . to boiling point (100°C .), in $4\frac{1}{2}$ minutes, when the kettle is connected to a supply at the rated voltage; given that 1 calorie is equivalent to 4.2 Joules.

Also find the cost of heating the water if a unit costs 8d.

5. How does the resistance of a conductor vary with (a) its length; (b) its cross sectional area?

A heating element is made of wire 0.02 inch diameter wound into a coil of 360 turns; the mean length per turn is $\frac{3}{4}$ inch. Calculate the resistance of the element, if the specific resistance of the material is 88 microhms per inch cube.

6. State Ohms Law.

How many cells, each of E.M.F. 2 volts and internal resistance 0.05 ohm would be required to send a current of 10 amps through an external resistance of 3 ohms, if the cells are to be joined in series.

7. Explain the difference between the E.M.F. of a cell, and the P.D. across its terminals when delivering current.

A battery of E.M.F. 24 volts and internal resistance 1 ohm is connected to three resistors of 2, 4 and 5 ohms connected in series. Determine the voltage drop across the 5 ohm resistor, and the terminal P.D. of the battery.

8. Describe what happens when the N pole of a long magnet is moved rapidly in and out of the core of a closed coil. Give a diagram to show the motion of the magnet, and the direction of the momentary current in the coil.