

AN ROINN OIDEACHAIS.
(DEPARTMENT OF EDUCATION)

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

CERTIFICATE EXAMINATIONS

for

DAY VOCATIONAL COURSES, 1957.

MAGNETISM AND ELECTRICITY.

Tuesday, 11th June—10 to 12 noon.

Instructions.

Not more than *five* questions to be attempted.

All the questions carry equal marks.

1. What do you understand by a "line of force"?

Draw a map showing the lines of force for two bar magnets, placed parallel and a short distance apart, with like poles opposite each other.

2. Show by neat sketches the magnetic field due to a current in

(a) a straight conductor,

(b) a long coil.

In each case indicate the direction of the current and of the magnetic field.

3. Define (a) the ampere, (b) the joule.

If a current of 4 amperes flows in a resistance of 10 ohms for 5 minutes, calculate—

(i) the applied voltage,

(ii) the power supplied,

(iii) the energy supplied.

4. State Ohm's Law.

Describe an experiment to verify Ohm's Law, giving a diagram of the apparatus.

5. Explain the difference between the E.M.F. and terminal P.D. of a cell.

A cell has an E.M.F. of 4 volts and when delivering a current of three amperes its terminal P.D. falls to 3.76 volts.

Calculate the internal resistance of the cell. What would be the terminal P.D. when the cell delivers a current of 2.5 amperes ?

6. A factory uses twelve 150-watt lamps, and forty 100-watt lamps for a period of 250 hours. Calculate

(a) the current taken from the mains when all the lamps are lighting, if the rated voltage is 200.

(b) The cost of the energy supplied, if the charge is $7\frac{1}{2}$ d. per unit for the first thousand units, and $4\frac{1}{2}$ d. per unit for the remainder.

7. A wire has a resistance of 1.8 ohms. What would be the resistance of a wire of the same material five times longer and of half the diameter ?

Calculate the resistance of 100 yards of copper wire, one-tenth of an inch in diameter if the specific resistance of copper is 0.7 microhm per inch cube.

8. Explain "local action" and "polarisation" in a simple voltaic cell.

Eight cells, each of E.M.F. 1.5 volts, and each having an internal resistance of 2 ohms, are connected to an external resistance of 4 ohms. Calculate the current when

(a) all the cells are in series.

(b) when two cells are reversed.