

AN ROINN OIDEACHAIS
(DEPARTMENT OF EDUCATION)

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

CERTIFICATE EXAMINATIONS

for

DAY VOCATIONAL COURSES, 1956.

MAGNETISM AND ELECTRICITY.

Monday, 11th June—10 to 12 noon.

Instructions.

Not more than *five* questions to be attempted.

All the questions carry equal marks.

1. Draw a diagram to show the lines of force produced by a short bar magnet placed inside an iron ring. Mark the polarity of each pole, and the direction of the magnetic field.

What is meant by "magnetic screening"?

2. On what factors does the strength of an electro-magnet depend?

Give a diagram of a U-shaped electro-magnet, showing the direction of the current, and the resulting polarities.

What is meant by "magnetic saturation"?

3. Define (a) the Culcomb, (b) the Watt.

If 20 volts were applied to a resistor of 5 ohms for 4 minutes, calculate

(a) the current flowing.

(b) the quantity of electricity supplied.

(c) the energy in Joules supplied.

4. On what factors does the amount of heat developed by an electrical heating appliance depend?

An electric kettle contains a heating element of 40 ohms resistance, which is connected to a 200 volt supply.

Calculate, how long it will take to heat 1,000 grams of water from 20°C to 100°C . (1 Calorie = 4.2 Joules).

5. Describe, giving a suitable diagram, the electrolysis of copper sulphate solution *or* silver nitrate.

In the electrolysis of copper sulphate solution, if 0.1 gram of copper was deposited on one of the electrodes by a current of 0.25 ampere in 20 minutes, calculate the electro-chemical equivalent of copper.

6. How should twelve cells, each of E.M.F. 1.5 volts be connected to form a battery of E.M.F. 6 volts?

If the cells, each of internal resistance 1.8 ohms, are arranged in series, and connected to an external resistance of 14.4 ohms, calculate

(a) the current;

(b) the power developed by the battery.

7. Describe an experiment to determine the resistance of a coil of wire.

What length of copper wire of cross-sectional area 0.00084 square inch would have a resistance of 1.5 ohms, if the specific resistance of copper is 0.7 microhm per inch cube.

8. In a building there are eight lamps of 75 watts each, ten of 40 watts each, and a 2 kilowatt fire. Calculate

(a) the current taken when all the lamps and fire are switched on if the supply voltage is 200.

(b) the cost of the energy supplied to the lamps and fire for 120 hours, at 6d. per B.O.T. unit.

What current would this electric fire take if used on a supply of 120 volts instead of the rated voltage 200, assuming the resistance remains constant?