CERTIFICATE EXAMINATIONS
for
DAY VOCATIONAL COURSES, 1963.

MAGNETISM AND ELECTRICITY

MONDAY, 17th JUNE.— 10 a.m. to 12 noon.

INSTRUCTIONS.

Not more than <u>five</u> questions to be attempted.

All the questions carry equal marks.

Illustrate your answers with sketches and diagrams where possible.

1. Define the coulomb.
   During an experiment in which a voltameter was used to coat an ornament with nickel, the following results were obtained:

Original weight of ornament	: 121 gm.
Weight of ornament after coating	: 123·4 gm.
Time at start	: 3.45 p.m.
Time at finish	: 4.35 p.m.

   Calculate (a) the total quantity of electricity which passed through the voltameter and (b) the current. The E.C.E. of nickel is 0·0003 gm. per coulomb.

2. Describe, with the aid of a diagram, the construction and operation of any device which makes use of an electro-magnet.
   Draw the magnetic field which surrounds two bar magnets and a piece of soft iron when they are placed as shown in the diagram below.

   Soft iron

   | N   S | | N   S |
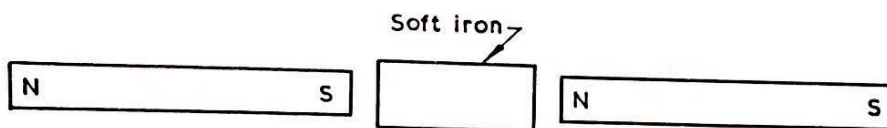
3. Give brief answers to any <u>five</u> of the following:
   (a) Why is soft iron used in the cores of electromagnets?
   (b) Why is it often dangerous to use wood as an electrical insulator?
   (c) Why are ships' magnetic compasses unreliable when sailing near the North or South poles?
   (d) Why would it be wrong to replace a fuse with a piece of thick copper wire?
   (e) A hall is to be lit by ten 150 w. bulbs from a 250 v. supply. Would a 5 amp. fuse carry the necessary current?
   (f) Why must an ammeter have a low resistance compared to the remainder of the circuit in which it is connected?

4. Name and define the following electrical units:
   (a) the unit of current;   (b) the unit of resistance.

   A current of 2 amps. flows in a 5 ohm resistor connected through a switch across a supply. It is desired to connect a second resistor in parallel with the first so that the total current flowing increases to 2·5 amps. (the terminal P.D. remaining the same). What will be the value of the second resistor?

5. Describe how a secondary cell is constructed and charged. What is the main difference between this type of cell and a primary cell?
   Draw a diagram to show how two 2 volt cells may be used to supply current to two 4 volt bulbs.

6. A water heater has a heating coil rated at 1000 watts. The heater contains 25 gallons of water at 20°C. If 1½ units of electrical energy are supplied to the heater, find: (a) the final temperature of the water, and (b) the time taken to reach this temperature. You may assume that all the heat generated is used to heat the water.

   1 gallon of water weighs 4,546 grams.
   1 calorie = 4·2 joules.

7. Draw a diagram of a simple type of electric motor. Name each part and describe what each part does when the motor is running.