COMMONWEALTH PUBLIC SERVICE.
FOURTH DIVISION.

Examination No. 2586. 22nd September, 1945, and subsequent dates.

FOR PROMOTION OR TRANSFER AS SENIOR TECHNICIAN.
TELEPHONE, POSTMASTER-GENERAL'S DEPARTMENT, ALL STATES.

WRITTEN EXAMINATION.

(a) General.

Time allowed: Three hours.

Note.—A Candidate is required to attempt only six of the following questions; three of the questions must be selected from Section A and three questions from Section B. No Credit will be given for more than six answers.

Maximum marks 100; Pass marks 60.

SECTION A.

1. A moving coil milliammeter gives a full scale deflection with a current of 10 milliamperes. The resistance of the meter is 5 ohms.

(a) Describe with the aid of circuit diagrams how you would use the instrument to measure—
(i) A direct current of 10 amperes,
(ii) A direct voltage of 100 volts.

What additional apparatus would be required?

(b) If the 100 volts in (a)(ii) was that of a dry battery having an internal resistance of 100 ohms. What would be the error in the reading obtained?

[15 marks.]

[TURN OVER.]
2. (a) Describe, with the aid of a sketch, the action of a moving coil voltmeter.

(b) How would you use the instrument to measure the resistance of the coil of a telephone relay? —[15 marks.]

3. (a) Outline the principles employed in three different types of meters used for measuring alternating currents.

(b) What are the relative advantages of these three types of meters for the measurement of alternating currents of from 1 to 10 milliamperes at speech frequencies? —[20 marks.] ~

4. (a) When the coil circuit of a telephone type relay is disconnected, the armature does not release immediately. Explain the reason for this.

(b) What methods are employed to increase the release time of a relay?

(c) What is the effect on the release time of varying the following adjustments:
   (i) The spring tension.
   (ii) The length of stroke of the armature.
   (iii) The residual air gap. —[15 marks.] ~

SECTION B.

1. (a) Draw a sketch showing the components of a secondary cell (accumulator) of a capacity of approximately 1,000 ampere-hours at the normal 10 hour discharge rate.

(b) What indications are given of a short circuit between two plates in a secondary cell?

(c) How would you locate such a short circuit between plates? —[20 marks.]

2. (a) Draw a schematic diagram of the power circuit of an automatic exchange in which automatic voltage regulators are provided.

(b) With the aid of a sketch, briefly describe the general construction and operation of any type of automatic voltage regulator with which you are familiar. —[15 marks.]
3. (a) Draw a schematic circuit of a constant potential type metal rectifier suitable for operating a small automatic exchange.

(b) Describe the method of operation of the unit over a typical day.

---[15 marks.]---

4. (a) Describe, with the aid of a circuit diagram, a method of obtaining a delayed alarm of 30 seconds or longer using a thermionic valve. Indicate on the circuit the approximate values of the various components.

(b) What factors limit the maximum reliable delay period obtainable with this circuit?

(c) If the above circuit is to be installed in an automatic exchange what features need to be considered in choosing the valve to be used?

---[15 marks.]---