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.

(70)

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 milliameter 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.]

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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.]

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