Paper No. *§Radio Amateurs' Examination*

55/1 (May)

City and Guilds of London Institute

1963-4

Radio Amateurs' Examination

Friday, May 8th, 1964, 6.30 to 9.30 p.m.

This paper contains ten questions: EIGHT questions in all are to be attempted, as under:

Both questions in Part I (which are compulsory) and SIX others from Part II.

Failure in either part will carry with it failure in the examination as a whole.

Mathematical tables are supplied: they must be given up at the close of the examination. Slide rules may be used.

PART I

Answer both questions in this part

1. What are the conditions of the Amateur (Sound) Licence regarding:
   (*a*) frequency control and measurement,
   (*b*) non-interference with other amateur stations and other wireless telegraphy stations,
   (*c*) retransmission of recorded messages? *(15 marks)*

2. What is meant by over-modulation of an amplitude-modulated radiotelephony transmission?
   What are the undesirable effects of over-modulation?
   Describe a simple over-modulation indicating device and explain its action. *(15 marks)*

PART II

Answer six questions from this part

3. Describe the flow of current into and out of a capacitor when an alternating voltage is applied to its terminals.
   What is meant by wattless current?
   What is the capacitive reactance of a capacitor of 3·18 microfarads to alternating currents of frequency
   (*a*) 100 c/s and
   (*b*) 1000 c/s? (*10 marks*)

4. With the aid of a circuit diagram, describe a beat frequency oscillator suitable for use in a superheterodyne receiver for the reception of c.w.
   Explain its action. (*10 marks*)

5. Describe the construction of a transistor.
   With the aid of a circuit diagram, describe a practical use for a transistor. (*10 marks*)

6. What is the ionosphere?
   Two stations, 2000 miles apart, are to maintain twenty-four-hour contact. Why would it be necessary to use more than one transmitting frequency? (*10 marks*)

7. What are the properties of a material which decide whether it shall be regarded as a conductor or as an insulator?
   Describe the type of connecting wire you would use:
   (*a*) as the h.t. supply lead for a transmitter requiring 100 mA at 750 volts,
   and (*b*) for an l.t. supply of 10 A at 6 volts. (*10 marks*)

8. Explain what is meant by the piezo-electric effect of quartz crystal.
   Draw a circuit diagram of a crystal oscillator suitable for use in an amateur transmitter and explain its action. (*10 marks*)

9. Describe an artificial aerial and explain its use in an amateur sound transmitting station. (*10 marks*)

10. Sketch a dipole aerial and its masts or other supports.
    What are the practical considerations to be taken into account when erecting such a aerial? Show in your sketch how these considerations have been met. (*10 marks*)