Paper No. *§Radio Amateurs' Examination*

55/1 (Dec)

City and Guilds of London Institute

1967-8

Radio Amateurs' Examination

Thursday, December 7th, 1967, 6.30 to 9.30 p.m.

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

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

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

You should have the following for this examination:

One answer book, which includes squared paper (inches and tenths).

Mathematical tables (you may use a slide rule).

PART I

Answer BOTH questions in this part

1. What are the conditions of the Amateur (Sound) Licence A as regards
   (a) operators and access to apparatus,
   (b) recorded messages ?
   In what circumstances can demands be expected for the closing down of the station ?
   What special conditions apply to aerials or masts which are situated
   (a) in the vicinity of an aerodrome,
   (b) near overhead power wires ? *(15 marks)*

2. State the relative advantages and disadvantages of a crystal controlled oscillator as compared with a variable frequency oscillator for an amateur radio sound transmitter.
   What steps must be taken to ensure the stability of a variable frequency oscillator suitable for a multi-band h.f. transmitter ?
   (15 marks)

[See next page

PART II

Answer SIX questions in this part

3. Four primary cells are connected in series with a load resistor of 27 Ω. Each cell has an e.m.f. of 1.5V and an internal resistance of 0.75 Ω. What will be
   (a) the potential difference across the load,
   (b) the power dissipated in the load resistor ? *(10 marks)*

4. A circuit consists of an inductance of 40μH, a resistance of 10 Ω and a capacitance of 40pF connected in series. Calculate
   (a) the resonant frequency of the circuit (Resistance may be disregarded in this calculation),
   (b) the impedance of the circuit at resonance,
   (c) the impedance at 2000 kHz (2000 kc/s). *(10 marks)*

5. Describe the construction of a transistor suitable for use in an audio frequency amplifier.
   What is meant by the current gain of a transistor ? *(10 marks)*

6. Draw the circuit and describe the action of an i.f. amplifier stage of a superheterodyne receiver. Explain how the gain of the stage may be kept constant by the application of automatic gain control.

7. Describe a practical method of keying a c.w. transmitter.
   Explain the need for shaping the waveform of the keyed emission. *(10 marks)*

8. What is meant by
   (a) ground wave propagation,
   (b) ionospheric propagation,
   (c) tropospheric propagation ? *(10 marks)*

9. Draw the circuit diagram of a matching device for coupling a transmitter to an aerial feeder and explain the method of adjustment. *(10 marks)*

10. Draw the circuit diagram of the r.f. power amplifier stage of a c.w. transmitter. Indicate the points where meter readings should be taken to measure the d.c. power input to the stage or stages and explain how the power input is calculated. *(10 marks)*