City and Guilds of London Institute

1962-3

Radio Amateurs' Examination

Friday, May 10th, 1963, 6.30 to 9.30 p.m.

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. For what purposes may a U.K. amateur radio station be used?

   What types of messages and signals may be exchanged between amateur radio stations?

   Is an amateur radio station permitted to broadcast messages to amateur stations in general? (15 *marks*)

2. What is meant by " key clicks " and " chirps " in a radio transmission? How can they be minimised? (15 *marks*)

PART II

Answer six questions from this part

3. With the aid of a circuit diagram, describe a transmitter frequency multiplier stage and explain its action. (10 *marks*)

4. What is meant by the "*power rating*" of a resistor? What value of resistor would be required to provide a standing bias of 10 V when connected in the cathode lead of a triode valve whose anode current is 20 milliamperes?

   What power would be dissipated in heat by the standing current? (10 *marks*)

5. Describe the construction of

   Either (*a*) an i.f. transformer for use in a superheterodyne receiver at an intermediate frequency of 465 kc/s,

   or (*b*) a wide-band coupler for use in a transmitter on the 3·5 Mc/s band. (10 *marks*)

6. With the aid of a circuit diagram describe the operation of the power output stage of a receiver. (10 *marks*)

7. With the aid of sketches describe a directional aerial system suitable for use on the higher frequency amateur bands, i.e., 14 Mc/s or above. (10 *marks*)

8. An inductance of 31·9 microhenrys, a capacitance of 100 picofarads and a resistance of 10 ohms are connected in series with a source of alternating e.m.f. At what frequency will the circuit be in resonance with the applied e.m.f.?

   If the applied e.m.f. has a value of 20 V r.m.s. what current will flow in the circuit at resonance? (10 *marks*)

9. Draw the circuit diagram of the modulated stage of a simple radio-telephony transmitter and explain briefly its principles of operation. (10 *marks*)

10. Describe how an electro-magnetic wave is radiated from a simple vertical aerial. (10 *marks*)