

# City and Guilds of London Institute

1961

## 55.—RADIO AMATEURS' EXAMINATION

*Friday, May 5th, 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

*Both questions must be attempted in this part*

1. What records must be kept in an amateur radio station logbook?  
Who, in addition to the licensee, may operate an amateur station and what additional entry should such an operator make in the log?  
Who is authorised to inspect the log and station? (15 marks)
2. Describe three forms of interference to broadcast reception (sound or television) which can arise from the operation of an amateur station and explain how each can be minimised. (15 marks)

*Radio Amateurs' Examination*

PART II

*Six questions only to be attempted in this part*

3. Sketch the magnetic field associated with a solenoid through the windings of which a direct current is flowing. What is the effect of inserting an iron core? Why are laminated iron cores used in transformers? (10 marks)
4. Explain the superheterodyne principle of reception. Describe, with a block diagram, a typical superheterodyne receiver and explain the need for a beat frequency oscillator for the reception of C.W. telegraphy. (10 marks)
5. State Ohm's Law and define the units of e.m.f., current and resistance.  
Explain the principle of the potentiometer. (10 marks)
6. When an anode potential of 300 volts positive and a grid potential of 20 volts negative are applied to a radio-frequency power amplifier the anode current is 50 mA. What is the power input to the anode circuit of the valve? Show by a circuit diagram how the voltages and current are measured, and mention any precautions necessary to ensure accurate readings. (10 marks)
7. What is the velocity of an electro-magnetic wave in space? How are the frequency and wavelength related to the velocity? What is meant by *ground-wave* and *skip distance*? (10 marks)
8. Draw a circuit diagram of an oscillator stage suitable for use as a variable frequency oscillator in a low-power transmitter. Explain its action. (10 marks)
9. Explain the difference between the resistance and the impedance to alternating current of a series circuit in which resistance, inductance and capacitance are all present. Calculate the impedance to a.c. at 1000 C.P.S. of an inductor having a value of inductance of 1 henry and a resistance of 3085 ohms. (10 marks)
10. Describe the construction of a dipole aerial and feeder for 14 Mc/s. Show by diagrams details of the various dimensions, insulators, joints, etc. Draw a typical polar diagram for such an aerial, and indicate the direction of maximum and minimum radiation. (10 marks)