City and Guilds of London Institute

1960

55—RADIO AMATEURS' EXAMINATION

Friday, May 6th, 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.

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

Part 1

Both questions must be attempted in this part.

1 **What conditions are laid down by the amateur transmitting licence as regards**
(a) the avoidance of interference with other amateur stations and any other wireless telegraphy
and (b) the control and measurement of the frequency of transmissions?
(15 marks)

2 **Explain what is meant by over-modulation of a radio-telephony transmitter. What are the indications that a transmitter is being over-modulated, and what are the effects of over-modulation on :**
(a) the transmission from the station concerned
and (b) transmissions from stations transmitting on adjacent channels?
(15 marks)

see over

Part II

Six questions only to be attempted in this part.

3 Draw a circuit diagram of the power amplifier stage of a transmitter for use in the amateur bands between 3 Mc/s and 30 Mc/s. Sketch the layout of the tank circuit and describe the construction of the coils and capacitors of which it is composed. (10 marks)

4 What are the factors which limit the flow of anode current in a thermionic valve? Explain how the anode current in a triode valve is controlled by the potential of the grid with respect to the cathode. (10 marks)

5 Describe two methods of coupling a circuit carrying alternating current at radio frequency with another similar circuit. Illustrate your answer with practical examples. (10 marks)

6 Describe and explain a method of modulation suitable for use in an amateur telephony transmitter. (10 marks)

7 A coil whose inductance is 10 henries is connected in series with a capacitor of 10 micro-farad across a 240 volt, 50 c/s a. c. supply. What is the potential difference between the terminals of:

(a) the inductor

and (b) the capacitor ?

(Disregard any resistance of the coil) (10 marks)

8 Describe the propagation of electro-magnetic waves from a simple vertical aerial.

9 Draw a block diagram of a complete transmitter capable of transmitting c. w. or telephony in the 14, 21 and 28 Mc/s. bands. Explain the functions of each stage of the equipment. (10 marks)

10 Describe with the aid of diagrams a power unit suitable for supplying anode and heater power to a receiver. Explain the need for smoothing of the anode supply. (10 marks)