City and Guilds of London Institute

DEPARTMENT OF TECHNOLOGY

1953

55.—RADIO AMATEURS' EXAMINATION

Friday, May 1st, 7 to 10 p.m.

EIGHT *questions in all are to be attempted, as under*:
ALL *four in Part 1 (which carry higher marks) and four others from Part 2.*

Part 1.

All four questions to be attempted from this part.

1. State what requirements have to be met under the non-interference conditions of the Postmaster-General's licence to establish an Amateur Wireless Station, and say why these conditions are necessary. *(15 marks.)*

2. The D.C. feed to the last stage (triode) of a transmitter is 250 volts, 40 milliamperes. It is found that the r.m.s. value of the radio-frequency current flowing in a load resistance of 500 ohms is 0·1 ampere.

Calculate (*a*) the power input,
(*b*) the power output,
(*c*) the efficiency of the stage,
(*d*) the anode dissipation. *(15 marks.)*

3. With the aid of a diagram describe each of the following, indicating suitable values for the components:

(*a*) a radio-frequency filter for eliminating interference caused by sparking at the contacts of a transmitter key.
(*b*) a filter for insertion in the key leads to prevent key thumps.
(*c*) a mains filter for the power supply to a transmitter.

(15 marks.)

[SEE OVER]

4. (*a*) Describe by means of a circuit diagram one method of modulating a radio-frequency amplifier.

(*b*) Draw a diagram showing the modulation envelope of an amplitude modulated wave :

(*i*) modulated with a sine wave to approximately 50%,
(*ii*) " " " " " " " 100%,
(*iii*) " " " " " " over 100%.

(15 marks.)

Part 2.

Four questions only to be attempted from this Part.

5. Why is an aerial feeder often used in a transmitting aerial system ? Indicate by diagrams two types of feeders and describe the methods of matching. *(10 marks.)*

6. Describe briefly the operation of a straight receiver for C.W. reception. *(10 marks.)*

7. Describe a simple variable-frequency oscillator, and explain how frequency stability is achieved. *(10 marks.)*

8. With reference to wave propagation,

(*a*) What is meant by skip distance ?

(*b*) What are the main differences in propagation between the 14 Mc/s and 144 Mc/s bands ? *(10 marks.)*

9. Calculate the reactance offered at frequencies of 50 c/s and 50 Kc/s respectively of :

(*a*) an inductance of 5 henrys.

(*b*) a capacitance of 2 microfarads. *(10 marks.)*

10. What effects result from varying the coupling between two tuned circuits of a radio-frequency amplifier stage ? Illustrate your answer by selectivity curves. *(10 marks.)*