City and Guilds of London Institute

1958

55.—RADIO AMATEURS' EXAMINATION

Friday, May 9th, 6.30 to 9.30 p.m.

Eight questions in all are to be attempted, as under :
Both questions in Part 1 (which are compulsory) and six others from Part 2.

Part 1

Both questions must be attempted in this part.

1. Licence conditions. State the requirements in respect of the following :—
    (*a*) The use of call signs and notification of location ;
    (*b*) Non-interference ;
    (*c*) Re-transmission of recorded messages ;
    (*d*) Operators and access to apparatus ;
    (*e*) The kinds of messages which are prohibited.

                                              (*15 marks*)

2. Explain how the following types of interference can be abated :—
    (*a*) At the transmitter :
        (*i*) Harmonics ;
        (*ii*) Key clicks and thumps.
    (*b*) At the receiver :
        (*i*) Image response.
                                          (*15 marks*)

Part 2

Six questions only to be attempted in this part.

3. Explain the meaning of :—
    (*a*) Self inductance ;
    (*b*) Mutual inductance.
Define the unit of inductance.

                                           (*10 marks*)

[SEE OVER]

4. An alternating current of 20 volts at a frequency of 1 Mc/s is applied to a circuit consisting of a capacitance of 100 picofarads in series with a non-inductive resistor of 10 ohms.

(a) What value of inductance in series is required to tune the circuit to resonance ?

(b) At resonance, what is the current in the circuit ?

(10 marks)

5. Explain with the aid of a diagram the action of any circuit commonly used for the detection of amplitude-modulated signals.

(10 marks)

6. Explain briefly why superheterodyne receivers are :

(a) more selective, and

(b) more sensitive than TRF receivers.

Explain what is meant by an image signal and give an example.

(10 marks)

7. Describe by means of a circuit diagram a method of applying amplitude modulation to the power amplifier stage of a transmitter.

Indicate by means of a sketch the modulation envelope of an amplitude-modulated wave.

(i) Modulated with a sine wave to 50 per cent.

(ii) Modulated with a sine wave to 100 per cent.

(iii) Modulated with a sine wave over 100 per cent.

(10 marks)

8. State the relation between frequency and wavelength.

What are the frequencies corresponding to wavelengths of 500 m. and 10 cm.?

State the ranges of amateur frequencies which are more suitable for

(a) local transmissions ;

(b) distant transmissions.

(10 marks)

9. Why are standing waves undesirable in a transmitter-aerial feeder system ? How would you detect their presence and minimise them ?

(10 marks)

10. Draw the circuit diagram of a heterodyne wavemeter and explain how the instrument may be used for the accurate checking of frequency.

(10 marks)