

**55/1 (Dec.)**

# City and Guilds of London Institute

## 1964-5

### Radio Amateurs' Examination

*Thursday, December 10th, 1964, 6.30 to 9.30 p.m.*

This paper contains ten questions.

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. What are the limitations imposed by the Amateur (Sound) Licence on the establishment and use of an amateur transmitting station?  
What are the obligations of the licensee as regards operation and access to apparatus by other persons? (15 marks)
2. Describe three safeguards which can be incorporated in the design of a transmitter to keep harmonic radiation to a minimum.  
Explain clearly in each case how the amplitude of harmonics is reduced. (15 marks)

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**PART II**

*Answer six questions from this part*

3 What is meant by :

- (a) self-inductance,
- and (b) mutual-inductance?

What is the unit of inductance and upon what factors does the self-inductance of a coil depend? (10 marks)

4 Describe the construction of a semi-conductor diode and explain with the aid of a diagram how it may be used as a signal detector. (10 marks)

5 State Ohm's Law.

A 6-ohm resistor is connected across :

- (a) a battery of three lead acid cells, each having an e.m.f. of 2 volts and an internal resistance of 0.01 ohm.
- (b) a battery of four dry cells each having an e.m.f. of 1.5 volts and an internal resistance of 0.5 ohm.

What current will be passed by the resistor in each case? (10 marks)

6 With the aid of a block diagram, explain the functions of each stage of a superheterodyne receiver capable of receiving c.w. and telephony at any frequency in the range 1.5 Mc/s to 30 Mc/s.

What are the advantages of a superheterodyne receiver as compared with a tuned radio frequency receiver? (10 marks)

7. Describe with the aid of a circuit diagram a simple c.w. transmitter capable of operation on two or more h.f. amateur bands.

Explain the method of keying used and mention any advantages or disadvantages of this method. (10 marks)

8. Describe with the aid of diagrams a complete aerial system, including transmission lines and aerial tuning unit, for operation in one of the h.f. amateur bands.

State the purpose of each component in the system. (10 marks)

9. Explain the method of calculating the maximum d.c. input power of an amateur radio transmitter.

Show, with the aid of a circuit diagram, how the necessary measurements are made. (10 marks)

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10 What is meant by :

(a) critical frequency.

(b) m.u.f.,

and (c) skip distance.

Explain how these factors affect the choice of frequency for communication over a given distance. *(10 marks)*