

City and Guilds of London Institute

DEPARTMENT OF TECHNOLOGY

1947

55. — RADIO AMATEURS' EXAMINATION

Friday, May 2nd, 7 to 10 p.m.

Candidates should attempt as many questions as possible. Use should be made of diagrams where applicable. The maximum possible marks obtainable is affixed to each question.

1. An alternating voltage of 10 volts at a frequency of $100/2\pi$ Mc/s is applied to a circuit consisting of the following elements connected in series :
 - (i) an inductance of 10 micro-Henrys,
 - (ii) a capacitance of 10 pico-Farads,
 - (iii) a resistance of 10 ohms.
 - (a) What current flows through the circuit ? (5 marks)
 - (b) What voltage appears across the inductance ? (5 marks)

2. What is meant by the 'selectivity' of a tuned circuit ? On what circuit constants does it depend ?
Why is this quality necessary in a receiver ? (10 marks)

3. What is meant by the term 'C.W.' and what special method is needed to detect C.W. signals ? Describe a circuit arrangement which could be used for this purpose, illustrating your answer by a diagram. (10 marks)

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4. What is meant by modulation ? Describe a method of modulating a typical low-power R.F. amplifier. *(10 marks)*

5. What are the relative advantages and disadvantages of a variable frequency master oscillator over a crystal-controlled oscillator for use in an amateur transmitter ? Describe a variable-frequency oscillator of good frequency-stability. *(15 marks)*

6. Describe with the aid of a diagram, the circuit arrangement of a low-power crystal-controlled transmitter for the 58.5 to 60 Mc/s frequency band. *(15 marks)*

7. Describe FOUR types of aerial commonly used for amateur transmission and how they may be coupled to the transmitter. What are their relative advantages and disadvantages ? *(10 marks)*

8. Condition 8 of the Postmaster-General's licence to establish an amateur wireless station stipulates :

“Where the sending apparatus is not crystal-controlled there should be kept at the station ... a reliable frequency meter of the piezo-electric crystal type or other type approved by the Postmaster-General, for measuring the frequency to an accuracy of not less than $\pm 0.1\%$.”

Describe an apparatus to meet the foregoing requirement. Illustrate your answer by a diagram and explain how the apparatus is used.

(20 marks)