City and Guilds of London Institute

DEPARTMENT OF TECHNOLOGY

1946

55. — RADIO AMATEURS' EXAMINATION

Friday, November 15th, 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. Why are frequency multipliers sometimes employed in radio transmitters ? Describe, with diagram, a frequency-multiplying stage for a low-power transmitter. *(10 marks)*

2. What is "fading" and how is it caused ? *(10 marks)*

3. Describe briefly the principles of operation of a superheterodyne receiver, illustrating your answer with a block schematic diagram of a typical receiver. *(10 marks)*

4. The d.c. feed to the last stage of a transmitter is 250 volts, 60 mA. It is found that the h.f. 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. *(10 marks)*

[SEE OVER]

5. What are the advantages and disadvantages of directional aerials for transmission and reception ? Describe, with diagrams, a simple directional aerial and explain its method of operation. *(10 marks)*

6. Describe the principle of the heterodyne frequency-meter and explain how you would use it to determine the frequency of a received signal.

(10 marks)

7. (a) What is the purpose of key-click filters, and of what do they consist ?

(b) An amateur transmitter on the 14 Mc/s band was found to interfere with television reception on 41–45 Mc/s. How was the interference probably caused and what steps could have been taken to minimize it ?

(20 marks)

8. (a) What is the procedure laid down by the Postmaster-General for the use of callsigns when making and answering calls ?

(b) One condition imposed by the Postmaster-General as regards "Non-interference" is as follows :–

> "When telephony is being used, the system of modulation must be such as to prevent the carrier-wave being modulated more than 100 per cent."

What are the objections to over-modulation, and how would you minimize the risk of over-modulating ? *(20 marks)*