Paper No. *§Radio Amateurs' Examination*

55/1 (May)

City and Guilds of London Institute

1965-6

Radio Amateurs' Examination

Friday, May 13th, 1966, 6.30 to 9.30 p.m.

This paper contains ten questions : EIGHT questions in all are to be attempted, as follows:

Both questions in Part I (which are compulsory) and SIX questions in Part II.

Failure in either part will carry with it failure in the examination as a whole.

You should have the following for this examination:

One answer book, which includes squared paper (inches and tenths).

Mathematical tables (you may use a slide rule).

PART I

Answer BOTH questions in this part

1. For what purpose may an amateur sending and receiving station be used ?
   What are the conditions of the Amateur (Sound) Licence A as regards the keeping of the "Log" ?
   What details must be entered in the "Log" ? *(15 marks)*

2. What are the causes of keyclicks or thumps in a c.w. transmission ? What are the effects of such emissions on nearby receivers and what measures can be taken to reduce these effects ? *(15 marks)*

P ART II

Answer SIX questions in this part

3. Draw the circuit diagram of a heterodyne frequency meter for an amateur radio station.
   What means may be adopted to ensure accuracy of readings ?
   (10 marks)

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4. Draw the circuit diagram of the frequency-changer stage of a super-heterodyne receiver. What is meant by second-channel interference and adjacent-channel interference ? *(10 marks)*

5. State the functions of the various electrodes in a pentode thermionic valve. Describe the method of taking readings for a family of anode volts/anode-current curves. *(10 marks)*

6. What is meant by an *end-fed aerial* ?
   Describe an aerial coupling arrangement which will permit such an aerial to be used for multi-band working and explain the principles of operation. *(10 marks)*

7. Describe the construction of a smoothing choke suitable for a receiver power pack.
   A coil has an inductance of 2H. Calculate its reactance at frequencies of:
   (a) 3.18 c/s;
   (b) 3.18 kc/s.
   Determine the impedance in each case if the resistance of the coil is 60 Ω. *(10 marks)*

8. Two resistors are connected as a potential divider across a 12-V battery to enable a transistor to be operated with its emitter earthed and its base at a potential of 1 volt negative. The potential divider passes a standing current of 1 mA.
   Assuming the emitter current to be negligible, calculate the values of the two resistors and their wattage rating. *(10 marks)*

9. Draw the circuit diagram of a c.w. transmitter consisting of oscillator, buffer amplifier, frequency multiplier and P.A. stages. Indicate the points at which metering may be incorporated and explain carefully the use of meters in tuning and adjusting the transmitter.
   (10 marks)

10. Explain why it is necessary to vary the frequency of a transmitter in order to be able to maintain continuous contact between two station which are several thousand miles apart:
    (a) between day and night;
    (b) between winter and summer. *(10 marks)*