City and Guilds of London Institute

DEPARTMENT OF TECHNOLOGY

1954

55.—RADIO AMATEURS' EXAMINATION

Friday, May 7th, 6.30 to 9.30 p.m.

***Eight** questions in all are to be attempted, as under:*
***All four** in Part 1 (which carry higher marks) **and four** others from Part 2.*

Part 1.

All four questions to be attempted from this part.

1. (*a*) Explain why neutralisation is necessary when a triode valve is used in the R.F. power amplifier stage of a transmitter.
(*b*) With the aid of a diagram show how neutralisation is effected. (*15 marks.*)

2. How can the following types of interference be minimised:—
(*a*) at the transmitter,
(*i*) over-modulation,
(*ii*) harmonics, interfering with television reception,
(*iii*) spurious oscillation?
(*b*) at the receiver,
(*i*) image response,
(*ii*) blocking? (*15 marks.*)

3. With the aid of a simple diagram, describe a heterodyne frequency meter and explain how it is used to measure the frequency of a transmitter. (*15 marks.*)

4. State what requirements have to be met under the frequency control and measurement conditions of the Postmaster General's licence to establish an Amateur Wireless Station and say why these conditions are necessary. (*15 marks.*)

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Part 2.

Four questions only to be attempted from this Part.

5. With the aid of a diagram indicate the magnetic field associated with an air-cored cylindrical coil through which direct current is flowing. How does the strength of the magnetic field depend upon,

(*a*) the magnitude of the current,

(*b*) the number of turns ?

What is the effect of inserting an iron core in the coil and why are laminations used for the core when A.C. is used ? (*10 marks.*)

6. What is meant by the term resonance ?

If an inductance of 50 microhenrys is in series with a capacitance of 500 pico-farads what is the resonant frequency ?

π^2 may be taken as 10. (*10 marks.*)

7. (*a*) State the relationship between the frequency and the wavelength of a radio wave.

(*b*) What are the frequencies corresponding to wavelengths of 150 m., 2 m. and 75 cm. ? (*10 marks.*)

8. Define the following terms :—

(*a*) mutual inductance,

(*b*) amplification factor,

(*c*) A.C. resistance (anode slope resistance).

State the relationship between them. (*10 marks.*)

9. Describe with the aid of a block schematic diagram a superheterodyne receiver suitable for continuous wave reception and state briefly the purpose of each stage of the receiver. (*10 marks.*)

10. Explain briefly why standing waves are undesirable in a feeder system connecting a transmitter to an aerial. How would you detect their presence and minimise them ? (*10 marks.*)