CITY AND GUILDS OF LONDON INSTITUTE

PAPER NUMBER	EXAMINATION	
765 – 1 – 01/02	RADIO AMATEURS	Thursday 15 May 1975
SERIES MAY–JUNE 1975	PAPER WRITTEN	6.30 to 9.30 pm 3 hours

YOU SHOULD HAVE THE FOLLOWING FOR THIS EXAMINATION

one answer book

This examination is divided into two parts; failure in either part will carry with it failure in the examination as a whole.

Each question in Part I carries 15 marks; each question in Part II carries 10 marks.

Answer EIGHT of the following ten questions as follows: BOTH questions in Part I and SIX questions in Part II.

PART I – Answer BOTH questions in this part. Each question in this part carries 15 marks.

1. (a) State the THREE purposes for which an amateur sending and receiving station may be used.
   (b) State FOUR types of emission or message which may NOT be sent by or from an amateur station.

2. (a) What are harmonics of a radio frequency emission?
   (b) Why is it important that they be suppressed as far as possible?
   (c) Describe carefully, with the aid of diagrams, FOUR measures which can be taken in the construction and installation of an amateur sound transmitter to reduce harmonic radiation to a minimum.

PART II – Answer ANY SIX questions from this part. Each question in this part carries 10 marks.

3. (a) Describe a variable capacitor suitable for use as the tuning capacitor in an hf tuned circuit.
   (b) What are the differences between a tuning capacitor for a variable frequency oscillator and that for the tank circuit of a transmitter power amplifier stage?

4. (a) In describing an alternating current circuit what is meant by
      (i) frequency
      (ii) cycle
      (iii) root mean square (RMS) voltage?
   (b) Describe how an e.m.f. is induced in a loop of wire rotated at a constant speed in a uniform magnetic field.

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5. (a) Why is it necessary to use different frequencies at different times of the day if twentyfour hour radio contact between the same two stations is to be maintained on high frequencies over long distances?
   (b) How is the choice of such frequencies affected by
      (i) the season of the year
      (ii) the sunspot cycle?

6. Answer EITHER (a) OR (b).
   (a) With the aid of a circuit diagram, describe how the following can be measured in the case of a triode valve
      (i) mutual conductance
      (ii) amplification factor
      (iii) a.c. resistance or impedance.
   (b) With the aid of a circuit diagram describe how the collector current (Ic)/collector to emitter voltage (Vc) curves can be plotted for a transistor in the common emitter configuration.

7. (a) Draw the circuit diagram of the frequency changer stage of a superheterodyne receiver and describe its action.
   (b) Explain briefly how the frequency difference between the signal frequency and the local oscillator frequency is kept constant across the tuning range of the input signal circuit.

8. In amplitude modulation what is meant by
   (a) depth of modulation
   (b) modulation envelope
   (c) sidebands?

9. (a) Describe, with the aid of block diagrams, how a cathode ray oscilloscope can be used to examine the waveform of the radio frequency output of a radio transmitter.
   (b) How could this arrangement be used to check the depth of modulation of an amplitude modulated wave?

10. (a) What is meant by
      (i) a half wave dipole aerial
      (ii) a full wave dipole aerial?
   (b) With the aid of diagrams, describe suitable coupling circuits and feeder arrangements for each type of aerial.