CITY AND GUILDS OF LONDON INSTITUTE

PAPER NUMBER	EXAMINATION	
055 – 1 – 01 / 02	**RADIO AMATEURS' EXAMINATION**	**Tuesday** **11 May 1971** **6.30 to 9.30 pm** **3 hours**
SERIES **MAY - JUNE 1971**	PAPER	
YOU SHOULD HAVE THE FOLLOWING FOR THIS EXAMINATION **one answer book** **'Castle's Logs'**		

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

The maximum mark for each question is shown.

Answer EIGHT of the following ten questions as follows: BOTH questions in PART I (which are compulsory) and SIX questions in PART II.

PART I – Answer BOTH questions in the part

1. (a) What is the maximum speed at which call signs should be sent in Morse ?
   (b) How should call signs be sent in radiotelephony ?
   (c) How frequently should the call sign be transmitted ?
   (d) What indications must be given in the call sign when the station is being used from alternative premises, temporary premises and temporary locations ?
   (e) What prefix is used by a station being operated in
      (i) Channel Isles
      (ii) England
      (iii) Isle of Man
      (iv) Northern Ireland
      (v) Scotland
      (vi) Wales ?
   (f) How often should details of temporary premises or locations be sent ?
   (g) What are the regulations concerning the retransmission of recorded messages ?

(15 marks)

2. Why is a transmitter, having a class-C final amplifier stage, more liable to radiate harmonics than is a transmitter having a class-A amplifier ?
   With the aid of a block diagram, show where a low-pass filter could be inserted to minimise the radiation of harmonics from a transmitter.
   Draw the circuit diagram of a filter to suppress harmonics of above 30 MHz and describe its construction. What types of capacitors and inductors would be used ?

(15 marks)

PART II – Answer SIX questions in this part

3. Describe the construction of a power transformer having a primary winding adjustable for 200, 220 and 240 V, 50 Hz supplies and capable of providing outputs at 500-0-500 V 100 mA, 6.3 V 3 A and 12 V 1A. Ignoring any transformer losses, what is the primary current when the secondaries are supplying their full rated output and the primary e.m.f. is 240 V 50 Hz ?

(10 marks)

See next page

4. With the aid of diagrams, describe how electromagnetic waves are set up in a simple aerial.

(10 marks)

5. Three resistors having values of 50 Ω, 25 Ω and 25 Ω respectively are connected (a) in parallel and (b) in series.
What is the resistance of the combination in each case ?
What current would flow in each combination when 6 V is applied and in each case what current would flow in each individual resistor ?

(10 marks)

6. Draw the circuit diagram of a three-stage tuned radio frequency receiver having at least one stage of radio frequency amplification, and describe its operation.

(10 marks)

7. What is meant by the terms 'mutual conductance', 'amplification factor' and 'a.c. resistance' as used of a thermionic valve ?
Describe the construction of a pentode or beam tetrode valve suitable for use as the final amplifier in an amateur sound transmitter.

(10 marks)

8. Draw the circuit diagram of a c.w. telegraphy transmitter capable of operation on AT LEAST THREE amateur h.f. bands.
Describe carefully the operation of the system of keying employed and explain the steps taken to ensure a good waveshape.

(10 marks)

9. Describe the construction of EITHER a directional receiving aerial suitable for use in the 1.8 MHz to 2 MHz band OR a directional transmitting aerial for use in an h.f. band. Describe the directional properties of the aerial selected.

(10 marks)

10. Draw the circuit diagram of a push-pull final amplifier stage suitable for use with an amateur sound transmitter. Include and explain the metering arrangements necessary for measuring the d.c. input power to the stage.
What alternative method of determining power input can be used for single-sideband (type A3J or A3A) emissions ?

(10 marks)