CITY AND GUILDS OF LONDON INSTITUTE

PAPER NUMBER	EXAMINATION	
765–1–01/02	RADIO AMATEURS' EXAMINATION	Thursday 16 May 1974
SERIES	PAPER	
MAY–JUNE 1974	WRITTEN	6.30 to 9.30 pm 3 hours

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 this part.

1. (a) What are the three conditions of the Amateur (Sound) Licence regarding recorded messages?
   (b) What are the requirements of the Amateur (Sound) Licence regarding interference to other wireless telegraphy arising from
   (i) the apparatus comprising the station
   (ii) the use of the apparatus? (15 marks)

2. (a) With the aid of a circuit diagram, explain the action of a low-pass filter having a cut-off frequency in the region of 30 MHz and suitable for use in reducing harmonic radiation from an hf transmitter.
   (b) With the aid of diagrams explain carefully the construction of such a filter and describe how it should be connected. (15 marks)

PART II — Answer SIX questions in this part.

3. (a) What is meant by power in an electrical circuit?
   (b) What is the unit of electrical power?
   (c) A 100-ohm resistor has a potential difference between its ends of 8 volts d.c.
   (i) What power is being dissipated in the resistor?
   (ii) In a practical circuit what power rating would be required for such a resistor?
   (iii) If a current of 250 mA was flowing in the resistor, what power would be dissipated? (10 marks)

4. (a) Explain what is meant by
   (i) resistance
   (ii) inductive reactance
   (iii) capacitive reactance
   (iv) the Q or magnification factor of an inductor.
   (b) What is the Q factor at 500 kHz of a coil of 1 mH inductance and having a series r.f. resistance of 20 ohms? (10 marks)

See next page

5. Describe with the aid of waveform diagrams the action of the circuit of Fig. 1 when used as the detector stage of an amplitude modulation receiver. (10 marks)

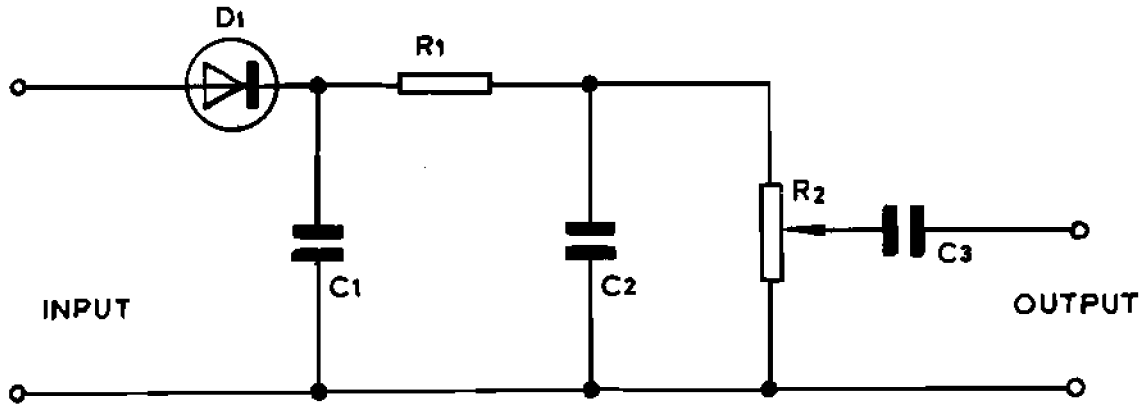

FIG. 1

6. Describe the construction of a non-reactive dummy load of 75 ohms resistance and sketch a typical arrangement for use at high frequencies. Describe the purpose and method of use of the device. (10 marks)

7. State the meaning of each of the following terms when used in connection with the propagation of electro-magnetic waves
   (a) polarisation
   (b) field strength
   (c) maximum usable frequency
   (d) skip distance. (10 marks)

8. Describe a simple v.h.f. converter designed for use with an h.f. receiver. (10 marks)

9. (a) What is meant by the piezo electric effect of quartz crystal?
   (b) Describe briefly the construction of a quartz crystal unit suitable for use in an amateur receiver or transmitter.
   (c) Draw the circuit diagram of a crystal controlled oscillator and name the components. (10 marks)

10. Describe a multi-band aerial suitable for use in a situation where space is restricted. Why is it preferable to use a single frequency aerial? (10 marks)