

# CITY AND GUILDS OF LONDON INSTITUTE

PAPER NUMBER <b>765-1-01/02</b>	EXAMINATION <b>RADIO AMATEURS</b>	<b>Monday 2 December 1974</b>
SERIES <b>DECEMBER 1974</b>	PAPER <b>WRITTEN</b>	<b>6.30 to 9.30 pm 3 hours</b>
YOU SHOULD HAVE THE FOLLOWING FOR THIS EXAMINATION  <b>one answer book 'Castle's Logs'</b>		

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. State the conditions of the Amateur (Sound) Licence A concerning
  - (a) receivers
  - (b) where and when the call sign assigned to the station is to be used
  - (c) use of the call sign suffixes /A and /P
  - (d) use of call sign prefix letters G, GM, GW, GI, GC and GD
  - (e) the transmission of call signs by radiotelephony. Give THREE examples from the recommended phonetic alphabet.
2.
  - (a) What is meant by parasitic oscillations in a radio frequency amplifier stage of a transmitter? Explain carefully the usual causes of this form of spurious omission.
  - (b) Describe with the aid of circuit and constructional diagrams how parasitic oscillation can be suppressed.

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

3. Describe the construction of a directional aerial system suitable for use in the 144 to 146 MHz band. How is the directional effect achieved?  
In what circumstances is a directional aerial desirable?
4. Draw the circuit diagram of the power output stage of a multi-band h.f. transmitter. Include the necessary meters for adjusting the amplifier and for calculating its d.c. input power. Write brief notes on the use of each meter.
5. What is meant by frequency modulated radiotelephony? Describe, with the aid of diagrams, a method of frequency modulating a carrier wave.
6. Draw a block diagram of a superheterodyne receiver suitable for the reception of emissions of types A1, A3 and A3J. Describe the function of each stage.

7. (a) What is meant by the dynamic impedance of a parallel tuned circuit?  
 (b) Explain, with the aid of a response curve diagram, the variation of impedance with frequency.  
 (c) Sketch typical response curves for the i.f. tuned circuits of a receiver when receiving  
 (i) continuous wave telegraphy  
 (ii) double-sideband amplitude-modulated radiotelephony.
8. Draw the circuit diagram of the demodulator and automatic gain control stage of an h.f. receiver. Describe how the a.g.c. voltage is derived and applied to the controlled stages.
9. What amateur frequency band would you choose for communication  
 (a) at a distance of up to 50 miles  
 (b) at a distance of 1000 miles during darkness in the winter  
 (c) at distances greater than 5000 miles over a daylight path?  
 Give reasons for your choice in each case.
10. The standing current through resistors  $R_1$  and  $R_2$  in the circuit shown in Fig. 1 is 1 mA and the emitter current is negligible in the quiescent state. What are the values of resistors  $R_1$  and  $R_2$  if the supply voltage is -12 volts and the base is to be kept at a potential of -1 volt to the emitter?

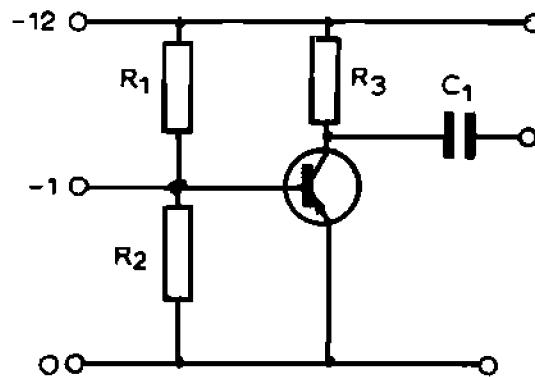


FIG. 1