

CITY AND GUILDS OF LONDON INSTITUTE

PAPER NUMBER 7 6 5 – 1 – 0 1/02	EXAMINATION RADIO AMATEURS	Monday 5 December 1977
SERIES DECEMBER 1977	PAPER WRITTEN	18 30 – 21 30 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.

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 from PART II.

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

- 1 For what purposes may the holder of an Amateur Licence A use his station? State clearly, the types of messages and signals that can be sent and received.
- 2 (a) When referring to spurious emissions from a radio transmitter what is meant by
 - (i) harmonics
 - (ii) parasitic oscillations.(b) Describe with the aid of circuit diagrams TWO devices which could be used between an h.f. transmitter and its aerial in order to limit the radiation of harmonics.

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

- 3 (a) With reference to an a.c. circuit, state what is meant by
 - (i) inductive reactance
 - (ii) capacitive reactance
 - (iii) impedance.(b) State the formula for calculating the impedance to a.c. of a series circuit having inductance, capacitance and resistance.
(c) What is meant by the resonant frequency of an a.c. circuit?
(d) What is the resonant frequency of a tuned circuit which has an inductance of 225 microhenries and a capacitance of 100 picofarads.
- 4 (a) What is
 - (i) self-inductance
 - (ii) mutual inductance.(b) On what factors does the self-inductance of a coil depend?
(c) Describe with the aid of a sketch, a simple experiment to prove the presence of mutual inductance between two coils.

- 5 With the aid of a circuit diagram describe the process of modulation in EITHER
 (a) a double sideband (A3) amplitude modulated transmitter
 OR
 (b) a frequency modulated transmitter (F3).
- 6 Fig. 1 shows the circuit of a radio frequency oscillator. Describe briefly
 (a) how forward biasing is obtained for the transistor emitter-base junction
 (b) how oscillations are set up and maintained
 (c) the factors which determine the frequency of operation.

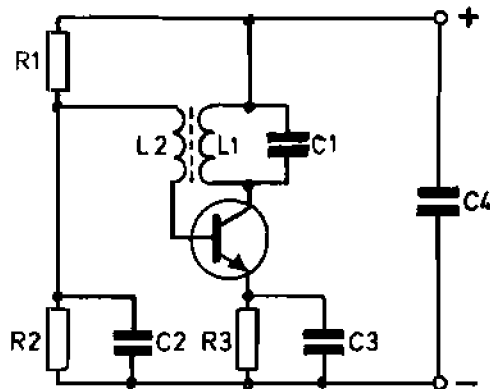


FIG. 1

- 7 The transmission of radio signals in the band 144 to 146 MHz is usually described as having 'line of sight' range. Explain why
 (a) reception at distances somewhat in excess of line of sight is usually possible
 (b) in some circumstances reception at much greater distances is possible.
- 8 (a) What is meant by 'standing wave ratio' with reference to an aerial feeder system?
 (b) When are standing waves on a transmission line undesirable?
 (c) How can the presence of standing waves on a transmission line be detected?
- 9 (a) Describe a dummy load suitable for use in an amateur transmitting station.
 (b) Explain why it is important that the load should be non-reactive as far as practicable and how this may be achieved.
 (c) What provision can be made to ensure that RF radiation from the dummy load is kept to a minimum?
- 10 Explain why a superheterodyne receiver has better selectivity and sensitivity than a TRF receiver.