Assessment Services
1 Giltspur Street London EC1A 9DD
Telephone 020 7294 2468 Facsimile 020 7294 2400

City & Guilds

OTS 99

Report on multiple-choice Question Paper

Paper: 7650-010 Radio Amateurs Examination

Examination series: 8 May 2000

Syllabus Topic or Objective	Number of items	Comments on performance of candidates
1 Licensing conditions	18	Candidates had a good understanding of the conditions of the Amateur Radio Licence and most of the questions were well answered. A question that always causes difficulty is one about non-interference. 57% of the candidates thought the Licence required that interference should not be caused to any electronic apparatus, whereas clause 4(2) of booklet BR68 states that the Station should not cause any undue interference to any wireless telegraphy.
2 Operating procedures and practices	7	Most of the candidates gave the correct answers to the questions on operating procedures and practices, including safety.
3 Electronic principles and practice	6	Some candidates found difficulty with a question that asked about the output connections from a bridge rectifier. 45% of the candidates answered the question correctly, while 28% of them were unable to recognise the correct polarity of the diodes. The other questions were well answered.
4 Receivers, transmitters and transceivers	8	Five question in this section were not well answered. In one question, only 30% of the candidates identified a ratio detector as being the device used for f.m. demodulation. A question on the use of a negative temperature coefficient capacitor in an oscillator was not well understood, many candidates not realising that it would help to compensate for increased inductance of the coil. Some candidates thought that the r.f. power output of an amateur station could be substantially increased by an improvement in the s.w.r. of the antenna system. The correct answer was to use an external linear amplifier. Over one-third of the candidates thought that one advantage of keying a buffer stage in preference to the oscillator was to eliminate key clicks, rather than to prevent possible changes of the oscillator frequency. Several candidates had difficulty in recognising the balanced modulator in a simplified block diagram of a transceiver. Many thought it was a buffer stage.
5 Transmitter interference	14	There were several questions on transmitter interference that were not well answered. 28% of candidates thought that a π-network used to reduce harmonic radiation in the output of a valve linear amplifier would behave as a band pass filter rather than as a low pass filter. 65% of candidates did not understand that chirp was often due to poor power supply regulation. 45% of them thought that it was caused by the fast rise time of the carrier envelope, evidently confusing chirp with key clicks. Almost half the candidates did not understand that a two-tone test is used for checking the operation of s.s.b. linear amplifiers. 38% of candidates confused the two-tone test with the tone used to access repeaters. In a circuit of a preamplifier, only 20% of candidates were able to identify the two capacitors that would help to attenuate high audio frequencies.

continued

Syllabus Topic or Objective	Number of items	Comments on performance of candidates
5 Transmitter interference continued		A question asked what type of device would be used to verify that a transmitter, which was *not* crystal controlled, was operating within the authorised bands. 43% of candidates chose to use an absorption wavemeter rather than one based on a crystal oscillator. Again, on frequency measurement, 30% of candidates thought that it was the number of display digits of a digital frequency meter that determined its accuracy, rather than the accuracy of its internal oscillator. The difference between precision and accuracy was evidently not understood.
6 Electromagnetic compatibility	14	Most of the questions on e.m.c. were well answered, just three of them requiring comment. Many candidates did not appreciate that digital circuitry containing a crystal clock would be likely to generate many harmonics of the fundamental clock frequency. Some candidates did not recognise the braid of television aerial coax as being a likely entry point of r.f. causing interference from a nearby h.f. transmitter. The use of a Faraday shield in the form of a metal screen between the primary and secondary windings of a mains transformer to prevent mains borne interference was not understood by many candidates.
7 Propagation and antennas	7	There was some confusion between the direction of the magnetic field of an electromagnetic wave and its relationship to the polarisation. Some candidates did not appreciate that long distance communication on frequencies above 50MHz is more likely to be due to refraction in the troposphere that to increased ionisation of the F-layer. 70% of candidates did not know that adding a director and reflector would reduce the impedance at the centre of a dipole. Most thought it would increase the angle of radiation.
8 Measurements	6	A disappointing number of candidates chose to use a multimeter switched to an a.c. range to measure the voltage across a resistor in a circuit with 250V d.c. applied. Being towards the end of the paper, this was probably due to candidates not reading the diagram and question correctly. A question that required the output power of a transmitter to be calculated was very badly answered. Instead of applying the formula I^2R to the load, many candidates appear to have multiplied the load current by the d.c. supply voltage.
General comments on the paper		Following a change in the Licence conditions since the examination paper was prepared, there was no correct answer to a question on greetings messages. So as not to penalise candidates, this question was excluded from the scoring. There was a total of 574 candidates for the May 2000 Radio Amateurs Examination. This report is based on a detailed analysis of the results of 497 candidates whose papers had been returned to City and Guilds by 26 May. The results of the remaining candidates may be delayed. People who took the examination were generally well prepared for it, and of the 497 candidates included in the analysis, 316 (63.6%) of them were successful. The above report indicates areas of weakness and, in particular, includes comments on those questions in which 25% or more of the candidates answered at least one of the distractors (wrong answers). The next scheduled Radio Amateurs Examination is on Monday, 4 December 2000. The City and Guilds examination fee will be approximately £28.50.

DMP 30/05/00