



Report on multiple-choice Question Paper

Paper: 7650-010 Radio Amateurs Examination

Examination date: 14 May 2001

Syllabus Topic or Objective	Number of items	Comments on performance of candidates
1 Licensing conditions	18	<p>Most of the questions on the licensing conditions were very well answered but some candidates found difficulty with four of the questions.</p> <p>In a question that asked which type of messages are excluded in the Amateur Radio Licence, 40% of the candidates chose "remarks of a personal character". Messages of this type are one of the principal uses of an amateur station [BR68 1(4)(a)].</p> <p>82% of candidates did not know the maximum power that can be used for a low power device used for remotely controlling a transmitter [BR68 2(4)(b)].</p> <p>A question asked for the circumstances in which the apparatus of the Main Station may be operated without the Licensee being present. 50% of candidates thought that the Station could be operated by another licensed amateur operator on the Licensee's behalf. The correct answer is when the Station is being controlled by a low power device during Unattended Operation [BR68 2(8)(a)].</p> <p>Again, a large proportion of candidates (30%) thought that the Licence required that interference should not be caused to any other electronic apparatus. The requirement is not to cause any undue interference with any wireless telegraphy [BR68 4(2)].</p>
2 Operating procedures and practices	7	<p>Four questions in this section were not well answered. 28% of the candidates thought that frequency modulated telephony occupied less bandwidth than c.w. telegraphy.</p> <p>55% of candidates did not realise that in addition to the Licence requirements, the station log may be used as a valuable aid to record communications and observations in full.</p> <p>On the use of amateur radio satellites, many candidates thought that they provided a facility for broadcasts to amateur stations in general, not realising that they could be used by holders of Amateur Radio Licence (B) to make international contacts.</p> <p>Note (u) of Booklet BR68 recommends a phonetic alphabet. However, it does not preclude other words if they are thought to be more appropriate, for instance, when contacting overseas countries where there may be language difficulties. In a question on the use of the phonetic alphabet, 37% of candidates thought that the words given in Note (u) must be used. [International Radio Regulations, Appendix S14]</p>
3 Electronic principles and practice	6	<p>64% of candidates were unable to calculate the peak-to-peak value of an r.m.s. voltage of 10V.</p> <p>Many candidates did not understand the effect of fitting a parallel tuned circuit in series with a receiver antenna. Such a 'rejector' circuit would reduce the signal at its resonant frequency and hence act as a 'wavetrap' to limit unwanted interference from a nearby station.</p> <p>In question that asked for what function a transformer cannot be used, 30% of candidates did not understand that a transformer can be used to supply a load whose impedance is different from that of the source.</p>

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4 Receivers, transmitters and transceivers	8	<p>In an example about interference from a 1940 kHz transmitter on the medium wave band at 1000 kHz, 56% of the candidates did not recognise this as second channel interference caused by poor image rejection in the receiver. A quarter of the candidates thought that the interference was due to harmonic radiation.</p> <p>A block schematic diagram was given showing the output circuit of a modern h.f. solid state transmitter. Only one third of the candidates recognised the use of low pass filters for each band.</p> <p>Many candidates did not know that an oscillator requires positive feedback in order to oscillate; 28% of candidates thought that a phase shift of 90° was needed.</p>
5 Transmitter interference	14	<p>The reason for not using class C operation for an s.s.b. amplifier was not understood, 27% of candidates thinking that the stage would be likely to self-oscillate.</p> <p>Many candidates did not know that the purpose of a buffer stage is to isolate the oscillator of a transmitter from other stages. Over a third of the candidates thought that its purpose was to prevent spurious oscillations.</p> <p>A question on long range key clicks caused much difficulty, one third of the candidates answering that clicks could be cured by improving the voltage stabilisation of the stage being keyed.</p> <p>Many candidates did not choose to use a calibrated receiver to check accurately the frequency of a transmitter; 26% of them would have used an absorption wavemeter.</p>
6 Electromagnetic compatibility	14	<p>Just over half of the candidates answered correctly a question about a 40W transmitter being fed to an antenna with a 6dB gain. The remaining candidates did not know that each 3dB of gain corresponds to a doubling of the effective radiated power (e.r.p.), assuming no feeder loss. Hence the e.r.p. would be 160W.</p> <p>All the other questions in this section were well answered.</p>
7 Propagation and antennas	7	<p>54% of candidates did not appreciate that long range communications on v.h.f. may be due to refraction in the troposphere. Candidates answered well the other questions on propagation and antennas.</p>
8 Measurements	6	<p>The effect of the internal resistance of analogue meters on the voltage measurements of a circuit was not understood by 57% of the candidates.</p> <p>A question on the method of determining the d.c. input of the final amplifier of a transmitter was not well answered, only 46% of candidates answering the question correctly.</p> <p>Fewer than half the candidates answered correctly a question on the calculation of the power dissipation of a transmitter, given the efficiency and the supply voltage and current.</p> <p>A circuit showing an absorption wavemeter was not recognised by 61% of candidates, 27% of them thinking that it was a device used to detect overmodulation.</p>

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General comments on the paper		<p>The Amateur Radio Licence provides the facility for Licensees to discuss technical investigations and requires them to carry out tests on their equipment from time to time. Uniquely, amateurs are afforded the opportunity of building transmitting equipment themselves and are not confined to using commercial and/or type-approved equipment. It is for this reason that the Radio Amateurs Examination requires a knowledge of technical and practical topics. The areas in the examination in which candidates are the weakest are those requiring a knowledge of basic principles, practical calculations and techniques. An analysis of the results of the examinations show clearly that not all candidates have had the opportunity of attending a course with adequate practical content and demonstration.</p> <p>The average percentage of candidates successful in the examination since the introduction of the multiple-choice format of paper in 1979 is 68.8%. The detailed analysis of the May 2001 examination showed the level of the paper to be about average. Of the 424 candidates included in the item analysis, 278 (65.6%) of them were successful. There were 67 additional candidates who entered for the examination but whose answer papers were not available at the time of this report.</p> <p>Reports for the Radio Amateurs Examination (7650) and the Novice Radio Amateurs Examination (7730) are normally available on the Internet about three weeks after the date of each examination at</p> <p style="text-align: center;">http://www.g4dmp.co.uk</p>