



## Report on multiple-choice Question Paper

Paper: 7650-001 Radio Amateurs Examination

Examination series: May 1996

Syllabus Topic or Objective	Number of items	Comments on performance of candidates
1 Licensing conditions	15	<p>In a question that asked what type of measuring equipment should be used to verify that a 144MHz crystal controlled transmitter is operating within the authorised band, only 45% of candidates answered correctly that is should be an absorption wavemeter. Most of the other candidates thought that a digital frequency meter was necessary.</p> <p>One question asked in what circumstances could the Station be used to send messages on behalf of a third party. The answer was "the User Service concerned", but many candidates answered "any other licensed radio operator". They did not appreciate that there are radio operators other than amateur, and messages may not be sent on their behalf through an amateur station.</p> <p>There was some misunderstanding about the date by which the Licence fee should be paid, many candidates not realising that it should be paid <b>before</b> the anniversary of the Date of Issue.</p>
2 Transmitter interference	15	<p>Nearly half the candidates chose to turn down the gain to reduce audio bandwidth, rather than to fit a capacitor across the microphone to limit the frequency response.</p> <p>The construction of a parasitic stopper was not well understood. Many candidates thought that a few turns wound on a resistor and connected in the collector of a power amplifier would prevent interference being induced into the power supply.</p> <p>36% of candidates said that an absorption wavemeter was suitable for verifying that a transmitter, that is <b>not</b> crystal controlled, is operating within the band. In this situation, a device based on a crystal oscillator must be used.</p> <p>In another question about frequency measurement, many candidates thought it was the number of digits, rather than the internal oscillator of a digital frequency meter that determined its accuracy.</p>

Syllabus Topic or Objective	Number of items	Comments on performance of candidates
<p>continued</p> <p>3 Electromagnetic compatibility</p>	<p>15</p>	<p>Questions on e.m.c. were quite well answered. There was misunderstanding by some candidates who chose a high pass filter at the output of a 144MHz transmitter to cure interference on the v.h.f./f.m. band. A band pass filter at the receiver was the correct answer.</p> <p>Not all candidates knew that fitting a ferrite bead on the base lead of a transistor audio amplifier could help to cure v.h.f. breakthrough. Many candidates chose to put it on the collector lead.</p>
<p>General comments on the paper</p>	<p>In general, the performance of candidates in this paper was quite good. From the comments above, it can be seen that topics relating to frequency measurement caused some difficulty. Many candidates did not understand the relative merits of the various devices and in what circumstances they should be used. Candidates need to read Appendix A - <i>Frequency Checking Equipment in Amateur Stations</i> in the Radiocommunications Agency document <i>How to Become a Radio Amateur</i>, and understand the various types of measuring devices that are recommended. Often, candidates have difficulty in determining what type of filter to use in order to cure a specified type of interference. In particular, there can be confusion between low pass, high pass and bandpass filters and in what circumstances they should be used.</p> <p>Of the 1312 candidates who took this paper, 977 (74.5%) of them were successful.</p>	



## Report on multiple-choice Question Paper

Paper: 7650-002 Radio Amateurs Examination

Examination series: May 1996

Syllabus Topic or Objective	Number of items	Comments on performance of candidates
1 Operating procedures	9	<p>Only half the candidates recognised the call sign of a novice station. Many thought that a novice call sign had the prefix GE.</p> <p>Candidates did not understand that it was recommended that s.s.b. should not be used on the 10MHz band. 42% of candidates chose the 50MHz band instead.</p> <p>Many candidates thought that the phonetic alphabet must be confined to the version quoted in the Licence.</p> <p>The other questions on operating practice were well answered.</p>
2 Electrical theory	6	<p>Most questions in this section were well answered. In a question on a transformer, a third of the candidates thought that it could not be used to supply a given current to a load that had a different impedance to the source.</p>
3 Solid state devices	7	<p>Many candidates did not realise that a common base amplifier has a gain less than 1. All other questions were well answered.</p>
4 Receivers	7	<p>A disappointing number of candidates thought that the local oscillator of a single conversion superheterodyne receiver should be crystal controlled. In another question, over a quarter of the candidates chose to use a product detector, rather than a ratio detector, as the demodulating stage in an f.m. receiver.</p> <p>In a question that asked candidates to identify the i.f. amplifier as being the stage that provided most gain, many candidates said it was the r.f. amplifier. The r.f. amplifier provides r.f. selectivity and second channel rejection, but often has very little gain.</p>
5 Transmitters	8	<p>Most questions on transmitters were very well answered and only one question requires comment. Nearly half the candidates thought that the heater supply to a valve p.a. stage needed to be d.c. The correct answer was that the heater supply should be bypassed to earth with capacitors.</p>

Syllabus Topic or Objective	Number of items	Comments on performance of candidates
<p>continued</p> <p>6 Propagation and antennas</p> <p>7 Measurements</p>	<p>9</p> <p>9</p>	<p>Only 41 % of candidates knew that the radials of a ground plane antenna are <math>\frac{1}{4}</math> wavelength long. Hence, for the 144MHz (2 metres) band they should be 0.5m long.</p> <p>The difference between fading and fade out was not well understood, many candidates not knowing that fade outs are caused by ionospheric storm conditions.</p> <p>Many candidates thought that it was necessary to measure the current to the oscillator, driver and p.a. stage in order to determine the d.c. power input of a transmitter.</p> <p>26% of candidates said that an absorption wavemeter only measured harmonics. Although an absorption wavemeter can be used to measure the presence of strong harmonics, its main purpose is to determine the approximate frequency of a transmitter or oscillator.</p> <p>The reason behind connecting the s.w.r. meter between the transmitter and the low pass filter, rather than between the low pass filter and antenna tuning unit was not understood. Candidates did not realise that it was connected in this position to lessen the risk of radiation of harmonics generated by the diodes in the s.w.r. meter. Many said that it was to enable p.e.p. measurements to be made.</p>
<p>General comments on the paper</p>		<p>Although some found the paper difficult, generally candidates were well prepared. Again, there was some evidence that benefit would be gained by greater use of practical demonstrations in courses of study for the examination. Knowledge of some of the fundamental measurements in an amateur station were lacking; for example, only 39% of the candidates knew how to measure the d.c. power input of a transmitter.</p> <p>Out of a total of 1378 candidates taking the paper, 1009 (73.2%) were successful.</p>