

Examination report – Dec 2014 series

2730-013 Fundamentals of Electronic Communication 3

Section 1 – Areas of good performance
<p>Syllabus reference: 2.12 / 2.13 – Distinguish between types of optical fibre. Describe the structure of optical fibres giving typical dimensions. Candidates generally done well in this section.</p> <p>Syllabus reference: 2.5 – Explain the terms associated with optical fibres. The answers for this section indicated that many candidates were unclear on the meaning of acceptance angle.</p> <p>Syllabus reference: 3.22 – Describe the principles and state the advantages of a dedicated data network in terms of noise reduction, faster bit rate and the elimination of the need for modems. The benefits of a dedicated data network were known by most candidates.</p> <p>Syllabus reference: 3.21 – Describe the function of cable modems and how they differ from modems designed for use over the PSTN. The detail needed for this section concerning cable modems was lacking.</p> <p>Syllabus reference: 4.6 – Explain the relationship between bit rate, system bandwidth and signal/noise ratio (Hartley-Shannon Law). Many candidates secured full marks for stating the Hartley-Shannon law, defining each symbol and calculating the bandwidth for the values of signal-to-noise given. However, no candidate realised that the relationship between bandwidth and signal-to-noise for a constant channel capacity is non-linear.</p> <p>Syllabus reference: 5.7 / 5.14 – Sketch and describe the frequency spectrum of an amplitude-modulated pulse train. Explain that the pulse train resulting from pulse-amplitude modulating an analogue signal contains the frequency of the unmodulated analogue signal together with a range of harmonics. Few candidates correctly calculated the minimum modulating frequency, maximum modulating frequency and sampling rate. Fewer candidates could construct the required frequency spectrum.</p> <p>Syllabus reference: 5.29 – Describe, with the aid of a simple diagram, the structure of the existing Plesiochronous Digital Hierarchy (PDH). The bit rates at each of the points in the structure of the PDH shown were known, but not their exact values in many cases. The number of required channels was correctly answered by most candidates. However, few candidates provided a correct answer for why the bit rate out of each multiplexer is greater than the sum of the bit rates at the input. The extra bits are an overhead for bit and frame synchronisation.</p> <p>Syllabus reference: 6.6 / 6.7 – Explain the meaning of 'sidetone'. List the disadvantages of excessive sidetone and of no sidetone. The majority of candidates had no difficulty with this section.</p> <p>Syllabus reference: 6.8 – Describe how sidetone is reduced to an acceptable level. The diagrams for the reduction of excessive sidetone in this section were poor in many cases with the accompanying explanations even poorer.</p> <p>Syllabus reference: 2.5 – Explain the terms associated with optical fibres. Many candidates had no difficulty with explaining the term reflection in relation to optical fibres.</p>

Section 2 – Areas for development
<p>Syllabus reference: 1.2 – Define the output resistance of a d.c. power supply. Few candidates knew the definition for the required output resistance. Open-circuit output voltage divided by short-circuit output current.</p> <p>Syllabus reference: 1.6 – Describe the need for, and methods of, providing over-voltage and current limiting for a d.c. power supply. Candidates provided only indefinite answers for this section. Many candidates ignored the figure provided of the voltage-current characteristic of an IC used for power supply protection in their answers and lost marks.</p> <p>Syllabus reference: 3.14 – Discuss the causes and nature of errors in the received digital signal in terms of noise and choice of bit rate. The cause of digital signal errors showed that many candidates didn't perform well in this section.</p> <p>Syllabus reference: 5.11 – Explain that a sine wave may be reconstructed from samples of its amplitude taken at more than two equally spaced intervals in its cycle. The minimum conditions for the reconstruction of a sine wave are regular samples taken at more than twice the frequency.</p> <p>Syllabus reference: 4.14 – Describe how a common channel may be shared by means of FDM. The subject of FDM in this section lacked comprehensive treatment.</p> <p>Syllabus reference: 6.9 – Explain the purpose of the regulator in a telephone instrument. Most candidates had vague ideas on the purpose of a regulator in this section. It is to compensate for varying length of lines to the subscriber's instrument from the local exchange.</p> <p>Syllabus reference: 6.37 – Describe how the operations involved in setting up a connection across a digital exchange, using time-space-time switching. In most cases, candidates produced vague concepts for the two switches. The need for both type of switches in PCM was unknown to the majority of candidates.</p>
Section 3 - General
<p>Candidates must read questions carefully before attempting answers. Candidates should note that the amount of detail needed for questions requiring explanations or descriptions is always proportional to the marks allocated.</p>