Examination report – Dec 2014 series

2730-011 Fundamentals of Electronic Communication 2

Section 1 – Areas of good performance
Syllabus reference: 1.22 – Calculate values of standard deviation for ungrouped data and grouped data. Answers were generally very good. Syllabus reference: 1.18 / 1.19 – Construct a cumulative frequency graph from a given frequency distribution. Determine the median, quartiles, deciles and percentiles from cumulative frequency data. This part was generally well answered by most candidates. Some candidates failed to indicate the median value on the frequency distribution but many distributions were correctly drawn. Syllabus reference: 1.9 / 1.12 – Define the octal and hexadecimal number systems and convert binary numbers to octal and hexadecimal forms. Convert between denary numbers and their BCD equivalents. The majority of answers were correct however there is still a tendency by some candidates to omit the calculation method. Syllabus reference: 1.4 – Add two compound binary numbers. Binary addition was reasonably well answered. Syllabus reference: 1.10 – Express octal and hexadecimal numbers in binary form. The number system conversion were generally well answered in the majority of centres. Syllabus reference: 2.13 / 2.19 – Construct a truth table for a given logic function with up to three input variables. State and prove, using truth tables, DeMorgan's theorem. The majority of answers were correct. Syllabus reference: 2.23 – Produce a given Boolean operation from a given set of logic elements. This section was mainly well answered, but the main problem area was identification of the NOR gate. Syllabus reference: 3.11 – Describe the properties of differing types of transmission links (channels). Mobile transmission links - this section was well answered. 4 c) Two to four wire converter: Majority of candidates answered this question well. Unfortunately some candidates misread the descriptive part and did not describe the function of the devices named in the question. Syllabus reference: 3.20 – Describe the bandwidth of common analogue signals. This section was well answered. Syllabus reference: 4.15 – Thermal noise calculation. Most candidates knew the formula but made mistakes during calculating. The main problem was indices. Syllabus reference: 5.24 – Calculate, in dBs and as a power ratio, the overall gain and/or attenuation of simple systems given the gain/attenuation of the individual stages. Reasonably well answered, however the use of indices caused problems.

Syllabus reference: 6.2 – Explain the four primary coefficients of a transmission line and sketch an equivalent circuit for a section of line.
There were many good answers, but some candidates omitted labelling of the diagram.

Syllabus reference: 6.25 – State typical values of Zo for open-wire and coaxial cables.
There were many good answers to the section on characteristic impendance.

Section reference: 7.1 – Sketch frequency response characteristics for filter networks and indicate the 3 dB frenquency.
Bandpass Filter - many good answers, however some candidates omitted labelling of the characteristic axes.

Syllabus reference: 7.3 / 7.4 – Identify from the frequency plots types of filter and sketch their standard block symbols. Determine the ultimate rate of signal voltage attenuation for a single-pole RC filter circuit (6dB/octave / 20dB/decade).
Many candidates stated the type of filter and estimated the cut-off frequency but the calculation confused the majority of candidates.

Syllabus reference: 7.7 – State expressions, and calculate typical values, for the resonant frequency and dynamic impedance of a parallel LC circuit.
Most candidates knew the formula. The main problem resulted from the use of powers in the calculations.
Syllabus reference: 8.19 – Describe the terms used in FM.
This section was reasonably well answered.

Syllabus reference: 8.25 – Sketch and describe the frequency/amplitude characteristic of a discriminator suitable for demodulating an FM signal.
This section was reasonably well answered, but some answers were too brief.

Section 2 – Areas for development

Syllabus reference: 1.1 – Convert a compound denary number with fractions limited to 1/32s to its binary equivalent and vice versa.
This part caused problems for the majority of candidates.

Syllabus reference: 2.5 – Logic switch arrangements.
This confused many candidates with many incorrectly drawing logic gate instead of logic switch arrangements.

Syllabus reference: 2.18 – Minimise a logic function of up to three variables using Boolean algebra and Karnaugh map grouping techniques.
This caused problems for many candidates, most problems resulting from lack of knowledge of the processes involved.

Syllabus reference: 2.27 – Describe, using waveform diagrams, the operation of the circuits drawn in astable, monostable and bistable.
Monostable – few candidates correctly answered this section. Most candidates attempted to guess but overall the answers were weak.

Syllabus reference: 3.1 – Explain that telecommunication systems involve; the transfer of information, the conditioning/coding of signals prior to transfer and the conditioning/decoding of signals after transfer.
Few candidates could explain the meaning of the term conditioning. Most candidates guessed at devices used for conditioning.

Syllabus reference: 3.19 / 4.4 – Explain the difference between baseband and broadband signals. Describe the sources of internal noise.
Few candidates could explain the terms Broadband and Thermal noise.

Syllabus reference: 4.13 – Solve problems relating to F and NF.
Few candidates correctly answered this section. Not many candidates knew the formula for Noise figure.

Syllabus reference: 5.8 – Apply the laws of logarithms to solve equations.
Even though there were some perfect answers to this section, most candidates struggled to perform the calculations.

Syllabus reference: 5.20 / 5.24 – Define the dBm (dB relative to 1mW), and describe its use in system calculations. Calculate, in dBs and as a power ratio, the overall gain and/or attenuation of simple systems given the gain/attenuation of the individual stages.
Benefits of using dBm - most candidates confused dBm with dB.

Syllabus reference: 6.3 – Describe why, in unloaded cables, R and C are the most significant primary coefficients and produce the effect of a low-pass filter.
Unloaded transmission line - this confused most candidates, many guessing at the coefficients involved.

Syllabus reference: 6.7 – Define the terms used in relation to the distortion effects of a rectangle pulse.
Rise time/sag - even though there were some good answers to this section, the majority were incorrect and poorly drawn.

Syllabus reference: 8.5 – Sketch an AM waveform in which the modulating signal is a sine wave.
Most candidates were able to sketch an amplitude modulated waveform but not many could indicate 50% modulation.

Syllabus reference: 8.1 – Explain the need for modulation.
Even though there were some good answers to this section, many candidates confused the need for modulation with the meaning of modulation.

Syllabus reference: 8.12 – Describe, with the aid of a frequency spectrum diagram, the components of a double-sideband AM signal.
Even though some candidates answered this section totally or in part correct, most candidates answered it incorrectly. One problem being candidates being unable to differentiate between a frequency spectrum diagram with a single frequency and that with a band of frequencies.

Section 3 – Recommendations

Questions should be read carefully, it must be understood that no marks can be allocated to answers that only state the name of a term and fail to define or describe the term.

Candidates should always check to make sure that graph axes are suitably labelled. An example of this is for a bandpass filter, sketching the frequency response characteristic and indicating the 3dB frequencies, where the band stop filter axes labelling is essential.

The presentation of graphs and sketches could be improved. Candidates should ensure they have reasonable drawing equipment and practice their graphical communication skills.

Section 4 - Tips

One of the observations made was that there seemed to be an increase in candidates lack of knowledge of some unit prefixes, milli, micro, nano and pico in particular in syllabus references 4.15, 5.24 and 7.7. A deeper study of these would result in candidates having the answers to calculations correct hence achieving all the marks.
The use of programmable calculators is not allowed in this exam, but candidates should be encouraged to use a scientific calculator.