Examination report – June 2013 series

2730-011 Fundamentals of electronic communication 2

Section 1 – Areas of good performance
Syllabus reference: 1.22 – Calculate the standard deviation. This part was generally well answered. A small amount of candidates just quoted that the answer had been found by calculator. An account of the process should have been given. It is assumed that the calculator was non-programmable as these are not allowed. No marks were awarded for this type of answer. Syllabus reference: 1.8, 1.13 – Number systems. The calculations for $B9_{16} + D4_{16}$ and $10110_2 + 110101_2$ were well answered. Syllabus reference: 1.9, 2.7, 2.8, 2.18 – Number system and logic. Mainly well answered, some problems involved the questions being wrongly copied from the exam paper or the questions not being answered using the method stated in the question. Syllabus reference: 2.19, 2.24, 2.28 – Multivibrators, De Morgan's theorem and oscillators. Some good answers but the explanations given for the difference between relaxation and sinewave oscillators were too brief generally. Syllabus reference: 5.3, 5.8 – Logarithms. Majority of candidates gave reasonable answers. Syllabus reference: 5.11, 5.18 – Telecommunication systems There were some very good answers, however, a few candidates confused the terms distortion and interference with each other. Syllabus reference: 5.23 – Signal-to-noise ratio This section was well answered. Syllabus reference: 5.22 – Voltage gain in dB Many good answers. Syllabus reference: 4.2, 4.4, 4.9 – Noise Majority of candidates answered this reasonably well. There were some cases where the type of noise was given not the source. Syllabus reference: 4.16 – Noise voltage calculation Reasonably well answered with the majority of candidates able to state and use the formula. Problems that did arise resulted from the use of powers ie micro and milli. Syllabus reference: 3.3, 3.10 – Distortion Most candidates answered these sections well, but in some cases there was confusion between distortion and noise.

Syllabus reference: 3.12 – Amplitude and frequency
Even though the majority of candidates gave good answers to this part, there were some candidates that wrongly assumed that the question related to modulation systems.

Syllabus reference: 3.24 – Wire conversion
In most cases this was well answered but in many cases the answers were brief, just stating the name of the devices in the blocks, not explaining their function.

Syllabus reference: 3.4, 3.6 – Transmission line
Many good answers.

Syllabus reference: 6.4, 6.17 – Characteristic impedance
Many good answers to this section.

Syllabus reference: 6.24, 6.25 – Characteristic impedance of coaxial cable.
Overall this syllabus section was reasonably answered, however, in many instances the explanations on the characteristic impedance for a coaxial cable were too brief, just stating the effect and leaving out the explanation.

Syllabus reference: 7.3 – Filters
Many good answers.

Syllabus reference: 7.7 – Resonant frequency and dynamic impedance
This section was reasonably well answered in most cases with candidates knowing the formulas required. The main problem resulted from the use of powers in the calculations.

Syllabus reference: 8.8, 8.12, 8.18 – Modulation
Generally very good answers.

Section 2 – Areas for development

Syllabus reference: 1.20 – Statistics.
Very few correct answers were given to appropriate situations for the use of the arithmetic mean as a measure of location. Most answers related incorrectly to the meaning of the term.

Syllabus reference: 1.8, 1.13 – Binary coded decimal.
Most candidates found difficulty with BCD number system.

Syllabus reference: 1.8 – Binary addition.
The calculation 110110_2 - 100101_2 required use of the 2's compliment method of binary subtraction, using addition. It caused problems for some candidates. Some candidates wrongly used the 2's compliment subtraction method for the calculation 1010.0101_2 + 110.1111_2.

Syllabus reference: 2.20 – De Morgan's theorem.
Not many correct answers to this part. Most gave examples of the theorem not its use in the implementation of logic systems.

Syllabus reference: 5.11 – Logarithms.
Many candidates had difficulty with this electronic calculation involving the exponential function.

Syllabus reference: 5.18 – Benefits of using Logarithmic units.
Many answers stated that calculations were "easy" or "simple", without any reasoning. Answers should be complete with all reasons given, for example: In ratio form long numbers are multiplied but in logarithmic form the ratios are much shorter numbers and can be added. This makes calculations less complicated and there is less chance of error.

Syllabus reference: 5.22 – Voltage gain in dB.
Majority of answers stated incorrectly that the output needed to be greater than the input. Not many answers related to the input and output resistances being equal.

Syllabus reference: 3.14 – Semi-duplex communication.
The descriptions were very good, diagrams were poor in general. Main problems were the omission of transmitter and receiver on both ends of the transmission link and systems that had two transmission links.

Syllabus reference: 6.7 – Rectangular pulse distortion.
Most candidates could define the terms but diagrams in general were poor. Most common problems were related to the time axis and not being able to show the definitions diagrammatically.

Syllabus reference: 6.2, 6.14 – Transmission line terminated in its characteristic impedance.
Not many correct answers to the equivalent circuit diagram, and even if the equivalent circuit was correct the load was omitted. Many candidates also did not relate to the fact that this was an ideally matched load.

Syllabus reference: 7.13 – The r.f. Oscillator.
This seemed to confuse many candidates and many resorted to guessing and just stating “amplify” or “filter”. Those that came closest only stated “adjust L” or “adjust C” without any description of the effects of adjustments.

Syllabus reference: 8.1 – The need for modulation.
Not many correct answers were given. Most candidates omitted the ability to achieve more channels without interference.

Syllabus reference: 8.25 – FM Discriminator.
Characteristic sketches were poor, no axes labelling, and incorrect shape of curve. Descriptions of operation were brief or incorrect.

Section 3 – Recommendations

Syllabus reference: 2.7, 2.8, 2.20
Candidates are advised to revise their logic systems as many candidates omitted or only partially completed the logic sections.

Syllabus reference: 6.24, 6.25
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.

Syllabus reference: 8.25
Candidates should always check to make sure that graph axes are suitably labelled. An example of this is where the shape of the FM discriminator and axes labelling is essential to the description of operation.

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 during the marking procedure was that there seemed to be an increase in candidates lack of knowledge of some unit prefixes, milli, micro, nano and pico in particular, 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.