Examination report – June2011 series

2730-016 Radio Systems

Section 1 – Areas of good performance
Syllabus reference: 1.5, 1.6, 1.85. The only correct definition for wave polarisation is the plane containing the electric field and the direction of propagation. Lack of attention to units was evident in the calculations. Few candidates adequately described how a local oscillator is used to secure a fixed value for the i.f. Syllabus reference: 1.30. This question was generally well done but few candidates realised that mismatch can endanger the output stage of the transmitter. There was little realisation of the effect of mismatch on the signal-noise of the received signal.
Section 2 – Areas for development
Syllabus reference: 1.16, 1.38. There were some good answers regarding the use of top capacitance to an antenna in section 1.16 but section 1.38 was poorly answered, with some candidates knowing little about propagation above 30MHz using the space wave. Syllabus reference: 1.43, 1.153. Bandwidth limitation for ionospheric propagation is 6kHz for section 1.43, which few of the candidates got correct. Frequency re-use was well known in part 1.153. Only a few candidates realised that different polarisations allowed frequency re-use in section 1.153. Syllabus reference: 1.46, 1.47. Section 1.46 was answered well. No candidate knew the response curve for a crystal in section 1.47. Syllabus reference: 1.57, 1.60. No candidate achieved full marks for this section. The bandwidth for section 1.57 is 12kHz and the sideband power is 320W. In section 1.60 the bandwidth is now that of the baseband signal, namely 5kHz. The power in the SSBSC signal is that of the total power of the DSB signal, namely 1320W. Syllabus reference: 1.106, 1.90. Some candidates knew the correct definition for sensitivity in section 1.106. The three response requirements for an r.f. amplifier are image channel rejection, sufficient gain with low noise to anticipate the noise injection from the following mixer and the prevention of local oscillator radiation. Syllabus reference: 1.111. Apart from the normal units employed in the superhet' arrangement, I wanted a limiter, a discriminator and some indication of de-emphasis in the block diagram and the following description. Syllabus reference: 1.135, 1.145. Many candidates did not realise that the main reason a mobile identifies itself to the nearest base station is so that its location is known at all times. The two air interfaces were unknown to most and many did not gain marks.

Syllabus reference: 1.140, 1.141. An expected better response was anticipated in the comparison of the two switching techniques in section 1.141. There was a huge of lack of detail in the answers to, hence at best candidates only secured three marks out of the seven awarded for this section.
Section 3 - Recommendations
• Careful reading of the questions. • More accuracy in the use of units in questions requiring calculations.