Examination report – December 2010 series

Paper no 2730 – 016 Radio Systems

Section 1 – Areas of good performance (question no/syllabus topic or reference)
Syllabus sections: 1.36, 1.15 - Varied results for syllabus section 1.36 from good and detailed descriptions of sky wave propagation to barely a couple of sentences. Similar comments for syllabus section 1.15 on dipoles. Syllabus section: 1.121 - A misread question by some. Part (a) required the honeycomb structure of cells to show how the coverage area for a cellular mobile system is achieved and part (b) the accompanying description, which for many again lacked the needed detail.
Section 2 – Areas for development (question no/syllabus topic or reference)
Syllabus section: 1.9/10 - The response on straight–wire resonance and the formation of a half–wave dipole was poor. Syllabus section: 1.106 - Hardly any candidates could define the image channel rejection ratio. . Syllabus section: 1.100 - The majority failed to correctly calculate the image frequency of 123.4MHz. Syllabus section: 1.17 - In making the distinctions between standing– and travelling–wave antennas, not many candidates wrote of resonance, bandwidth, and driving point impedance - all essential differences. Syllabus sections: 1.24 - On the need for a counterpoise was generally better answered than syllabus section 1.17. Syllabus section: 1.50 - Carrier frequency stability by international law was the essence of the answer although many did not provide it. Syllabus section: 1.55 - The two consequences of antenna mismatch were fairly well known. Syllabus sections: 1.66, 1.68 - This question showed that most candidates did not know the basic facts of FM. The separation of the spectral components in the frequency spectrum is the modulating frequency and the carrier frequency is always at the centre of the spectrum. Hence from the data given the modulating frequency for spectrum A is 10kHz and the carrier is 190kHz. By inspection, the modulating frequencies for spectra B and C are 10kHz and 5kHz respectively. Knowing that the number of measurable side frequency pairs is determined by the modulation index, should have given candidates to state that spectra A and C have identical values but that B had a greater value than A. Similar reasoning secures the relative values for peak frequency deviation. Syllabus sections: 1.82, 1.84 - The mathematical multiplication, required for syllabus section 1.82, was done well by those attempting the question. However, few were able to use the results of syllabus section 1.82 in their description for syllabus section 1.84.

Syllabus section: 1.105 - This question showed woeful ignorance on ganging and tracking. The starting point is that different frequency ranges for local oscillator and r.f. amplifier mean that an exact value for the i.f. cannot be obtained over a given frequency band. Addition of a padder or a trimmer secures exact values at two points (two–point tracking) with either a negative or a positive error in between. Use of both a padder and a trimmer creates three–point tracking with exact values at three points. The size of the errors is reduced with a positive error over one half and a negative error over the other half of the range. Sadly, these essential points were missing from most scripts. Syllabus sections: 1.131, 1.125 - The essential details of TETRA, were unknown by most candidates. The use of TDMA for the GSM system in most cases did not provide such essential details as the number of time slots, carrier bandwidth and carrier separation on up– and down–links. Syllabus section: 1.154 - Few candidates were able to give the diagram of an r.f.–to–r.f. transponder with its attendant description. Syllabus section: 1.35 - Many candidates could not give the correct radio bands.
Section 3 - Additional comments
In many case the presentation was sloppy, the reasoning weak and the knowledge lacking in depth. Candidates persist in giving what is not called for and omitting what is called for. Too many candidates were ill–prepared for this examination. A very poor set of results.