Engineering Triops Part 2A
Module 3F4. Data Transmission, May 2006- Answers

1. Generally well answered. Most candidates had difficulty in showing the result required in part (b). This was surprising since it is a bookwork example.

a) See notes.
b) See notes.
c)
(i)
(ii) $Q(3.33) = 4.3\times10^{-4}$
(iii) Add equalisation. Add Forward Error Correction (FEC).

2. This question was the most popular question and was in general answered very well. A few candidates used an incorrect assumption when determining the minimum Hamming distance in part (b).

a) See notes.
b) $d_{min} = 3$. Max no. of detectable errors = 2. Max no. correctable errors = 1.
c) See notes.
d)
(i)
(ii) $H = \begin{bmatrix} 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 & 0 & 1 \\ 1 & 0 & 1 & 0 & 1 & 0 \end{bmatrix}$ $G = \begin{bmatrix} 0 & 1 & 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 & 1 & 0 \end{bmatrix}$

3. This question was answered quite poorly. Part (a) was generally answered quite well. The evaluation of the power spectrum in part (b) posed most problems to candidates.

a) See notes.
b) See notes.
c) See notes.
d) See notes.

4. This question was generally well answered.

a) See notes.
b) $P_{BE} = \frac{2}{m}\left(1-\frac{1}{M}\right) Q\left(\sqrt{\frac{3m}{M^2-1}\frac{2E_b}{N_0}}\right)$.
c) 7.98 dB.
d) See notes.

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