

EE 706: Communication Networks

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Code B

Quiz 1 : **10 points** (45 min)

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0. Write down the code of your question paper next to your roll number. [0 points]
1. (a) Suppose a sender appends a CRC block of l bits to a message block of size $2m$ bits and transmits it across a binary symmetric channel with crossover probability q . Assume that the probability of undetected error is negligible and that the receiver is able to feedback detected error information back to the sender instantaneously without any overhead. When the sender is informed of errors in the transmitted message it retransmits the message. What is the throughput of this scheme? [1 point]
- (b) Suppose instead of appending a single block of l CRC bits at the end of the $2m$ bits, the sender inserts l CRC bits after the first m bits and l CRC bits after the second m bits. This block of $2m + 2l$ bits is transmitted over a BSC with crossover probability q . Only the m blocks in which errors are detected are retransmitted. What is the throughput of this scheme? [4 points]
2. Suppose a CRC scheme uses the generator polynomial $g(X) = (X + 1)(X^3 + X + 1)$. [5 points]
 - (a) Generate CRC check bits for the information bits strings 1011 and 1110.
 - (b) Give an example of a double-bit error which is detected by this CRC scheme.
 - (c) Given an example of a burst error of burst length 5 which is detected by this CRC scheme.
 - (d) Give an example of a double-bit error which is **not** detected by this CRC scheme.
 - (e) Given an example of a burst error of burst length 5 which is **not** detected by this CRC scheme.