Professor Tian

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IT4323

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**Chapter 10 & 11 Assignment**

1. **Q10-2** **What is the definition of a linear block code?**

**ANS** - Linear Code block is s an error-correcting code in which the exclusive-OR of any two codewords results in another codeword.

1. **Q10-4** **In a codeword, we add two redundant bits to each 8-bit word. Find the number of a. valid codewords & b. invalid codeword**

**ANS -** a = b + c

where c = 2 (redundant 2 bits, given)

b = 8 (8 bits data word, given)

so, a = b + c = 8 +2 = 10

Valid code words = 2b = 28 = 256 = 0b100000000 in binary

Invalid codewords = 2a**-** 2b = 210**-** 28 = 768 = 0b1100000000 in binary

1. **Q10-6 If we want to be able to detect 2-bit errors, what should be the minimum Hamming distance**
2. **Q10-8** **In CRC, if the dataword is 5 bits and the codeword is 8 bits, how many 0s need to be added to the dataword to make the dividend? What is the size of the remainder? What is the size of the divisor?**

The Size of a codeword and divided are the same, so if there’s 8 bits in the codeword which is the dividend, then there need to 3 more bits (0s) added to the dataword to make a dividend.

size of the remainder = codeword - dataword

=8 – 5

remainder = 3

size of the divisor = size of remainder + 1

= 3 + 1

divisor = 4

1. **Q10-10** **In CRC, which of the following generators (divisors) guarantees the detection of an odd number of errors?**
   1. 10111
   2. 101101
   3. 111

**ANS** - 101101 guarantees the detection of an odd number of errors. because it produces a remainder of 0 when divided by 112

101101 in decimal is 45 and 11 is 3

45/3 will results in 15 remainder 0.

1. **Q10-12** Assume we are sending data items of 16-bit length. If two data items are swapped during transmission, can the traditional checksum detect this error? Explain your answer.

**ANS - No.** this is because there would 2 errors and 2 errors cannot be detected

1. **Q11-2** Explain why flags are needed when we use variable-size frames.

**ANS -** flags are needed to separate a frame from the previous frame and the next frame

1. **Q11-4** Compare and contrast byte-oriented and bit-oriented protocols.  
   **ANS** – in byte-oriented protocol control information is encoded using entire bytes. whereas in Bit oriented protocol, protocols use single bits to represent the control information.
2. **Q11-6** In a byte-oriented protocol, should we first unstuff the extra bytes and then remove the flags or reverse the process?

**ANS**- An extra byte is stuffed in the data section which has a pre-defined bit pattern. in order to not confuse execution.

1. **Q11-8** Compare and contrast flow control and error control.

**ANS -** Flow control is to monitor the proper transmission of data from sender to receiver. while, Error Control monitors the error-free delivery of data from sender to receiver.

1. **Q11-22** Compare and contrast HDLC with PPP.

**ANS – HDLC is a bit-oriented protocol and PPP is a character-oriented protocol.**