ELEX 3525: Data Communications
2023 Fall Term

Quiz 2
11:30 – 12:20
Tuesday, October 24, 2023
SW03-2620

This exam has three (3) questions on two (2) pages. The marks for each question are as indicated. There are a total of nine (9) marks. Answer all questions. Write your answers and all rough work in this paper and nowhere else. Show your work. Underline or draw a box around your final answer. Numerical answers must include units. Books and notes are allowed. No electronic devices other than calculators are allowed. **Show your work.**

This exam paper is for:

Sample 1   A00123456

Each exam is equally difficult.

Answer your own exam.

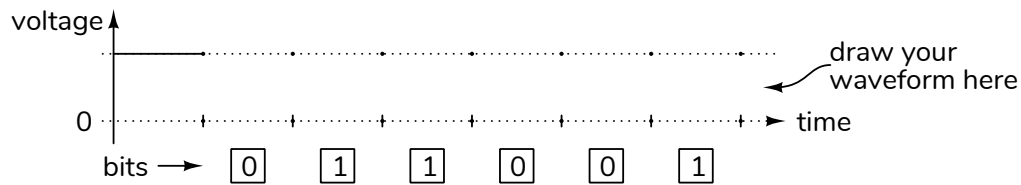Do not start until you are told to do so.

Name: _____

BCIT ID: _____

Signature: _____

Question 1   3 marks

Draw the *differential* NRZ waveform that would encode the bits shown in the boxes in the diagram below. Use the convention described in the lecture notes. Draw the waveform in the space shown above each of the six bits. The previous voltage of the waveform is as shown.

Question 2   4 marks

The following sequence of bytes, shown in hexadecimal, includes a frame that uses PPP framing as described in the lecture notes: `ff ff 7e 10 7d 5d 20 7d 41 7e 00`

Find the values of the bytes included in the frame. Give your answer in hexadecimal. Ignore bytes before or after the frame.

Question 3   2 marks

To test a communication system you've been told to use a maximal-length PRBS that includes a sequence of at least 12 consecutive zeros.

(a) What is the minimum number of flip-flops (n) required for a LFSR PRBS generator to generate such a sequence?

(b) What is the period, in bits, of a PRBS using this value of n?

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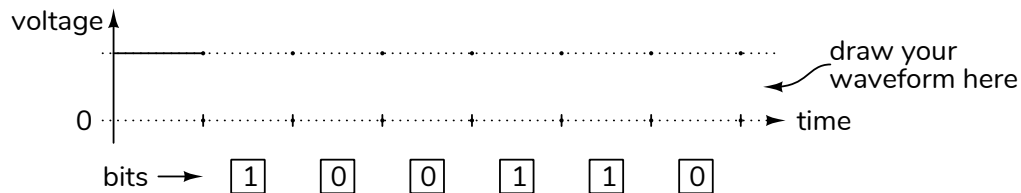Do not start until you are told to do so.

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(255)

Question 1 — 3 marks

Draw the *differential* NRZ waveform that would encode the bits shown in the boxes in the diagram below. Use the convention described in the lecture notes. Draw the waveform in the space shown above each of the six bits. The previous voltage of the waveform is as shown.

Question 2 — 4 marks

The following sequence of bytes, shown in hexadecimal, includes a frame that uses PPP framing as described in the lecture notes: `00 00 7e 00 7d 7d 20 7d 61 7e ff`

Find the values of the bytes included in the frame. Give your answer in hexadecimal. Ignore bytes before or after the frame.

Question 3 — 2 marks

To test a communication system you've been told to use a maximal-length PRBS that includes a sequence of at least 10 consecutive zeros.

(a) What is the minimum number of flip-flops (n) required for a LFSR PRBS generator to generate such a sequence?

(b) What is the period, in bits, of a PRBS using this value of n?