ELEX 2117 : Digital Techniques 2
2023 Fall Term

Quiz 3
9:30 – 10:20 PM
Friday, November 24, 2023
SW01-1021

This exam has three (3) questions on one (1) pages. The marks for each question are as indicated. There are a total of seven (7) 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:

Paper, Test 1   A00123456

Each exam is equally difficult.

Answer your own exam.

Do not start until you are told to do so.
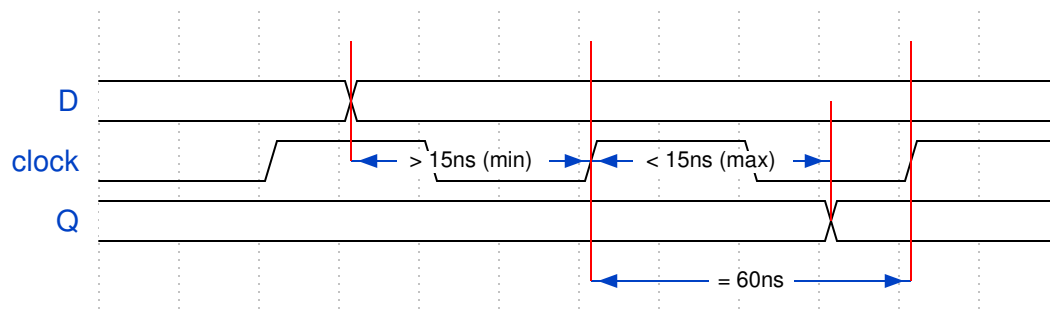
Name: _____

BCIT ID: _____

Signature: _____

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Question 1   3 marks

The diagram above shows three timing specifications for a register. The signals labelled D, clk, and Q are the register's input, clock, and output respectively. If this register is used in a circuit, what is the maximum propagation delay from Q to D that would result in reliable (non-metastable) behaviour? Show your work.

Question 2   2 marks

A digital device consumes 50 mW when operating continuously at 50 MHz. If it operates for half of the time at 50 MHz and half of the time at 5 MHz, how much power will it consume on average? Show your work. *Hint: The average of x and y is $(x + y)/2$.*

Question 3   2 marks

At the output of a DAC you measure the signal power as 100 mW and the noise power as 65.2 μW. What is the SNR in dB? What is the ENOB? Show your work. *Hint: SNR in dB is equal to $10 \log_{10}(S/N)$ where S and N are the signal and noise powers (in Watts) respectively.*

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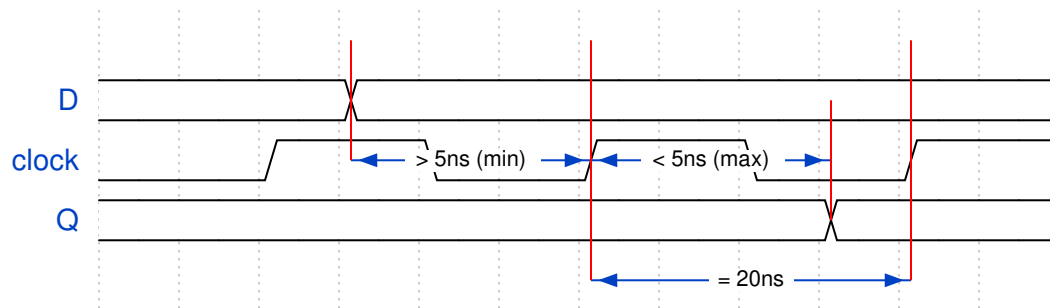
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Name: _____

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255

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Question 2   2 marks

A digital device consumes 50 mW when operating continuously at 50 MHz. If it operates for half of the time at 50 MHz and half of the time at 10 MHz, how much power will it consume on average? Show your work. *Hint: The average of x and y is (x + y)/2.*

Question 3   2 marks

At the output of a DAC you measure the signal power as 100 mW and the noise power as $1.02\,\mu$W. What is the SNR in dB? What is the ENOB? Show your work. *Hint: SNR in dB is equal to $10\log_{10}(S/N)$ where S and N are the signal and noise powers (in Watts) respectively.*