Cpr E 281 HW01

ELECTRICAL AND COMPUTER ENGINEERING
IOWA STATE UNIVERSITY

Initial Stuff and Basics
Assigned Date: First Week
Finish by Aug. 29, 2022

Instructions

Complete the questions below to the best of your ability. Do this on paper.
Once you are finished, upload a scanned PDF of your work to canvas.

Questions

P1. (10 points) Define the following terms in no more than 2 sentences each.

A. ASIC
B. ASCII
C. FPGA
D. VHDL

P2. (10 points) In the development process initial design-simulation-verification is one loop and prototype implementation-testing-verification is another loop. Answer the following in 4-5 sentences.

A. Which loop is relatively more expensive, and why?
B. Can any of these loops be avoided? If not, why not? If yes, what is the penalty?

P3. (10 points) Convert the following numbers to decimal:

A. 1010110_2
B. 1011_2
C. 175_8
D. 149_{16}
E. $ACDC_{16}$

P4. (10 points) Convert the following numbers to binary:

A. 47
B. 241
C. 118
D. 157_8
E. $BAAD_{16}$

P5. (10 points) Consider this array of bytes: [53_{16} 74_{16} 61_{16} 72_{16} 57_{16} 61_{16} 72_{16} 73_{16}].

A. Convert each byte of the array to a binary number (e.g $32_{16} = 00110010_2$).
B. Convert each binary number to an ASCII character (Refer to section 1.5.3 on pgs 14 - 16). What does it spell?

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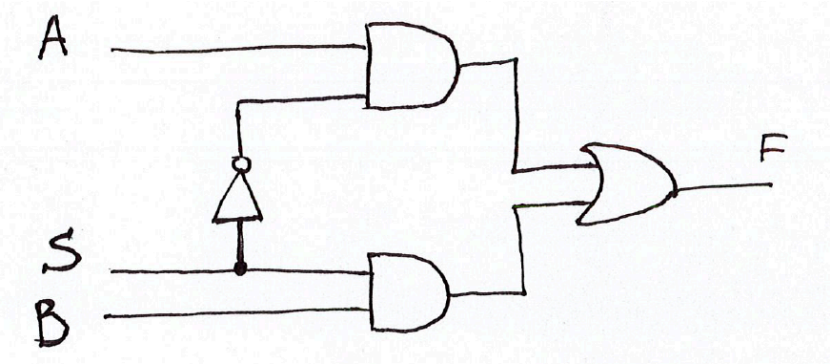
P6. (10 points) Consider the circuit below. Name the three inputs as A, B, and S and name the output as F.

A. Write the logic expression for it.
B. Write the truth table for the circuit.



P7. (20 points) Consider the logic function $f(x, y) = (x + \overline{y}) \cdot (\overline{x} + \overline{y})$

A. (8 points) Draw the circuit diagram for $f(x, y)$.
B. (8 points) Write the truth table for $f(x, y)$.
C. (4 points) By looking at the truth table in (b), what observation can you make about $f(x, y)$.

P8. (20 points) Given the following logic expression:

$$\mathbf{F(A, B, C) = (A + B + C)\ (A + \overline{B} + C)\ (B + C)}$$

A. (10 points) Draw the circuit diagram for $F(A, B, C)$.
B. (10 points) Drae the truth table for $F(A, B, C)$.