CSE 2301

Spring 2021

Midterm 3 Review

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1. Fill out the next states and the diagram for the JK flipflop
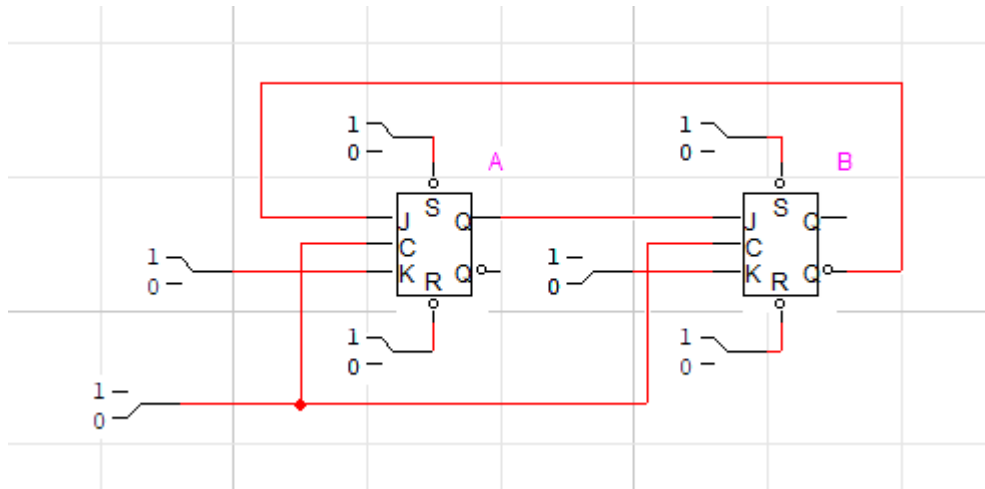
J	K	Q	Q+
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

2. Given the following K-map of the a three JK Flip Flop and input x for J1. What is the logical expression for J1? (Hint: Draw it out on scrap paper)

Q0/X		00	01	11	10
Q2/Q1	00	0	1	X	X
	01	1	1	X	X
	11	1	0	X	X
	10	0	0	X	X

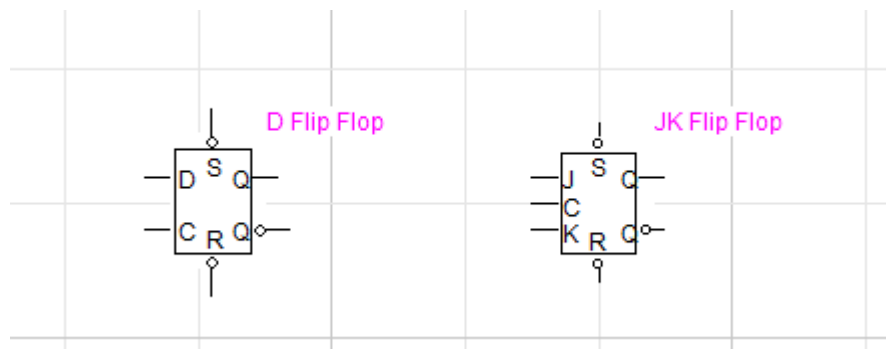J1 = Q1.X' + Q2'.X

3. Fill out the truth table for the following circuit

Current						Next	
QB	QA	JB	KB	JA	KA	QB	QA
0	0	0	0	1	1	0	1
0	1	1	0	1	1	1	0
1	0	0	0	0	1	1	0
1	1	1	0	0	1	1	0

4. Draw the circuit symbols for a D flip flop and a JK flip flop.

5. We want to make a sequence detector that detects the binary sequence "111" in any given binary sequence with overlaps. There would be 3 states:
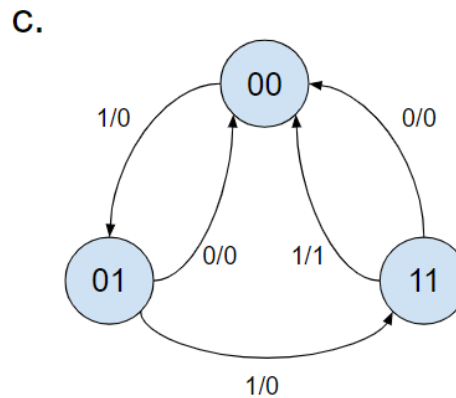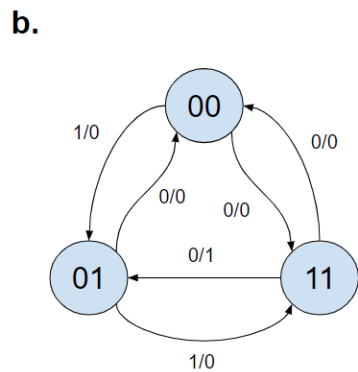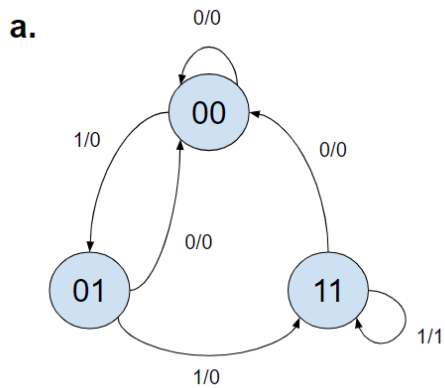
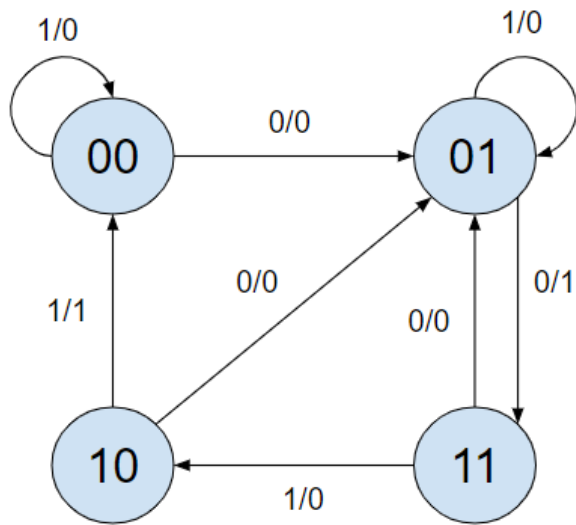No sequence   - 00
1 detected   - 01
11 detected   - 11

Which is the correct state diagram?

A is the correct diagram
B doesn't detect the right sequence, and C isn't a valid state diagram.

a.

b.

C.
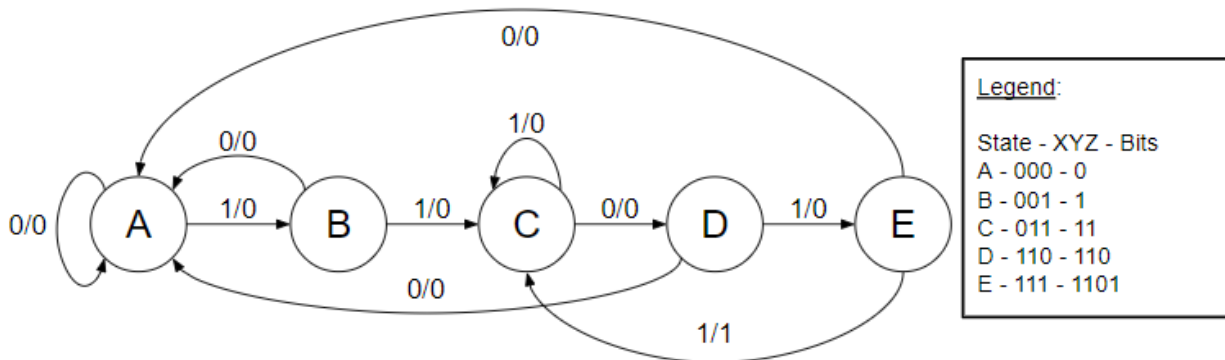
6. Given the following state diagram, fill out the state table.

Current		Input	Next		Output
QA	QB	X	QA+	QB+	Y
0	0	0	0	1	0
0	0	1	0	0	0
0	1	0	1	1	1
0	1	1	0	1	0
1	0	0	0	1	0
1	0	1	0	0	1
1	1	0	0	1	0
1	1	1	1	0	0

7. The state diagram below is for detecting the sequence "11011" where overlaps can occur. This question is much harder than you will likely see on the exam.

Fill in the chart below to implement this sequence detector on JK flip-flops.]
Yea, I know this is a hard problem. Don't worry, the exam won't be this difficult

X	Y	Z	Input	X+	Y+	Z+	JX	KX	JY	KY	JZ	KZ
0	0	0	0	0	0	0	0	X	0	X	0	X
0	0	0	1	0	0	1	0	X	0	X	1	X
0	0	1	0	0	0	0	0	X	0	X	X	1
0	0	1	1	0	1	1	0	X	1	X	X	0
0	1	0	0	X	X	X	X	X	X	X	X	X
0	1	0	1	X	X	X	X	X	X	X	X	X
0	1	1	0	1	1	0	1	X	X	0	X	1
0	1	1	1	0	1	1	0	X	X	0	X	0
1	0	0	0	X	X	X	X	X	X	X	X	X
1	0	0	1	X	X	X	X	X	X	X	X	X
1	0	1	0	X	X	X	X	X	X	X	X	X
1	0	1	1	X	X	X	X	X	X	X	X	X
1	1	0	0	0	0	0	X	1	X	1	0	X
1	1	0	1	1	1	1	X	0	X	0	1	X
1	1	1	0	0	0	0	X	1	X	1	X	1
1	1	1	1	0	1	1	X	1	X	0	X	0

8. True or False? 5400 Series chips have a wider operating range of temperatures and voltages than the 7400 Series chips?

       True

9. True or False? Shifting the contents of a loaded register to the left divides by two.

       False

10. Given the bit sequence "11001011011010," how many times (including overlaps) does the subsequence "1011" occur?

    a. 4
    b. <u>2</u>
    c. 3
    d. 0

11. What is the temperature range of the 7400 Series?

    a. -40°C to 85°C
    b. -55°C to 125°C
    c. 0°C to 100°C
    d. -273.15 °C to 1200°C

12. What does PRBS stand for?

    a. Practically Random Binary Sequence
    b. Proto Realistic Board Solder
    c. Pseudo Remote Banana Stand
    d. Pseudo Random Binary Sequence
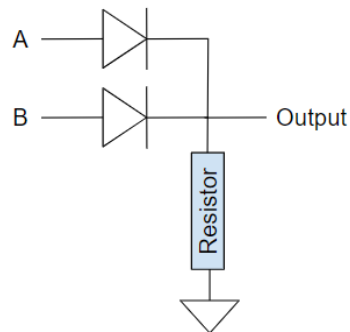
13. How many flips flops do you need to have a sequential circuit with 17 different states?

    a. 3
    b. 4
    c. 5
    d. 17

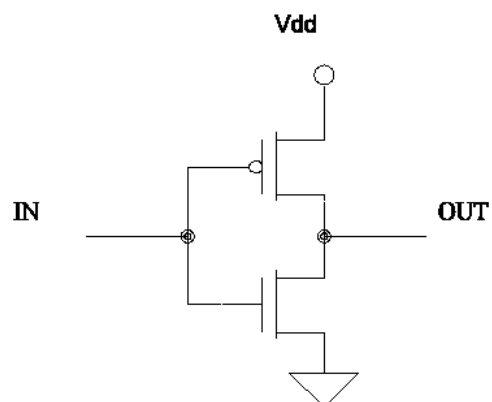14. Which of the following is a Shift Left Logical is performed on binary number 00101?

    a. **01010**
    b. 01011
    c. 00010
    d. 10010

15. What is the Diode Logic of the following circuit?

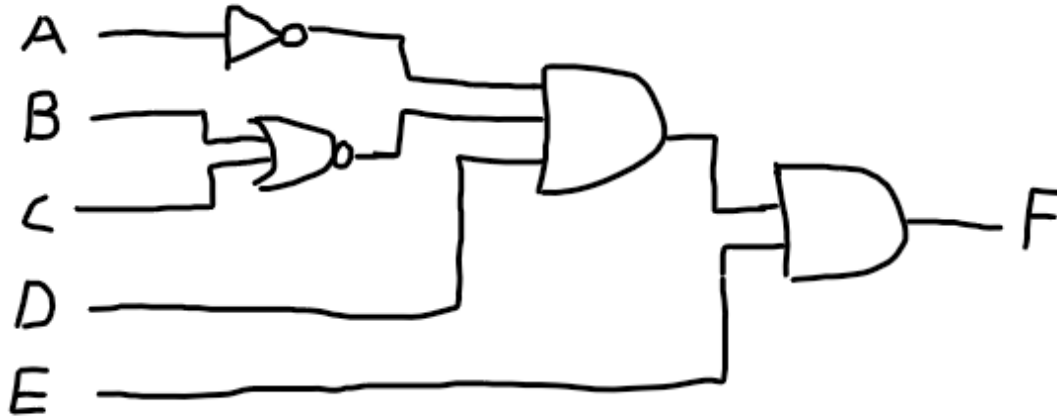   a. XOR
    b. NOR
    c. NAND
    d. **OR**

16. What is the CMOS logic of the following circuit?

    a. XOR
    b. **NOT**
    c. AND
    d. OR

e.   There is no logic. Nothing makes sense anymore.
17. The following circuit (that I drew in MS Paint because I gave up with google images) is broken. I think there is a stuck at fault at D. In order to the input for D, what should the other inputs be set to in order to see a change at output F? If you can't tell what the gates are, they are NOT, NOR, 3-AND, 2-AND.

A.   __0__ .
B.   __0__ .
C.   __0__ .
E.   __1__ .