Review Test Submission: Practice test - 1

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Course	Overview of Computer Architecture 2022
Test	Practice test - 1
Started	03/11/22 23:11
Submitted	04/11/22 00:21
Status	Completed
Attempt Score	19.5 out of 27 points
Time Elapsed	1 hour, 9 minutes
Results Displayed	All Answers, Feedback

Question 1

2 out of 2 points

What is the base-10 value of 0xE0 using 2's complement representation?

Response Feedback: Well done!

Question 2

2 out of 2 points

What is the base-10 value -10 when converted to base-2? Use 6 digits and 2's complement signed representation.

Response Feedback: Well done!

Question 3

0 out of 2 points

Using 2's complement, what is the octal representation of the hexadecimal value A9?

Response Feedback: 0xA9 = 0b10101001. To convert binary to octal, we need to group every three numbers in one group. However, 0b10101001 has only 8 bits. Thus, we have to sign extend this number with one (to maintain the sign). The sign-extended number becomes 0b110101001 = 0b 110 101 001 = 0o651

Question 4

2 out of 2 points

Assuming 6-bit inputs and an 8-bit output, which of the following numbers represents the sum of the two **unsigned** binary numbers 0b101001 and 0b011011 ?

Answers:
- 0x44
- 0xC4
- 0d196
- 0x3C
- not listed here

Question 5

0 out of 2 points

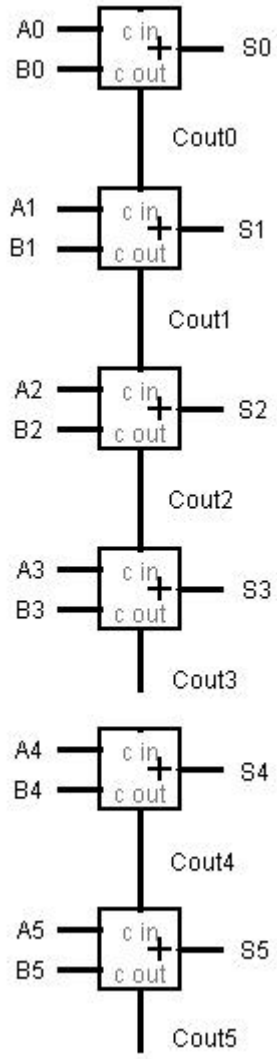
Assume 6-bit representation. The sum of the two **unsigned** binary numbers 0b111010 and 0b100101 is:

Answers:
- 0o27
- 0xD7
- 0x17
- 0d215
- not listed here

Response Feedback: 0b111010 + 0b100101 = 0b1010111. The result has 7 bits. So we just have to drob the most significant bit. So the 6-bit value is 0b010111 = 0b 010 111 = 0o27

Question 6

1.5 out of 2 points



For the above circuit diagram, complete the following table:

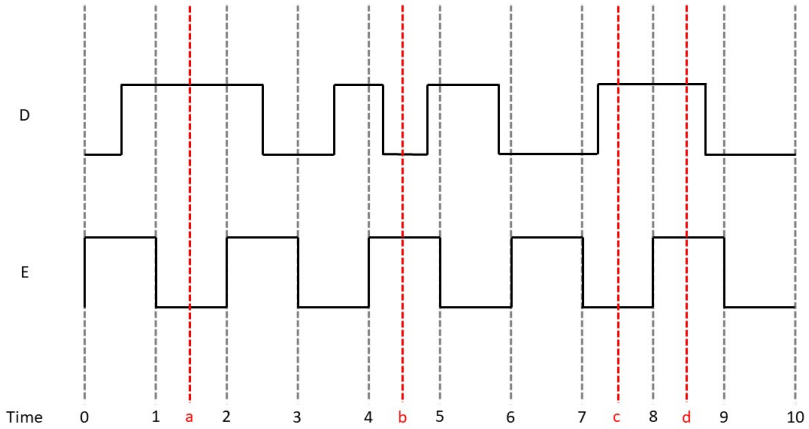
Adder Number	A	B	Cout	S
0	1	1	**[c0]**	**[s0]**
1	0	0	**[c1]**	**[s1]**
2	1	0	**[c2]**	**[s2]**
3	1	1	**[c3]**	**[s3]**
4	0	1	**[c4]**	**[s4]**
5	0	0	**[c5]**	**[s5]**

Response Feedback: As seen on the answer diagram, the values for Cout and S are as follows:

Adder Number	A	B	Cout	S
0	1	1	1	0
1	0	0	0	1
2	1	0	0	1
3	1	1	1	0
4	0	1	0	1
5	0	0	0	0

Question 7

2 out of 2 points



For the above active-high D latch waveform, complete the following table for the output Q at the hightlighted points in time a, b, c, and d:

Time	Q
a	**[a]**
b	**[b]**
c	**[c]**
d	**[d]**

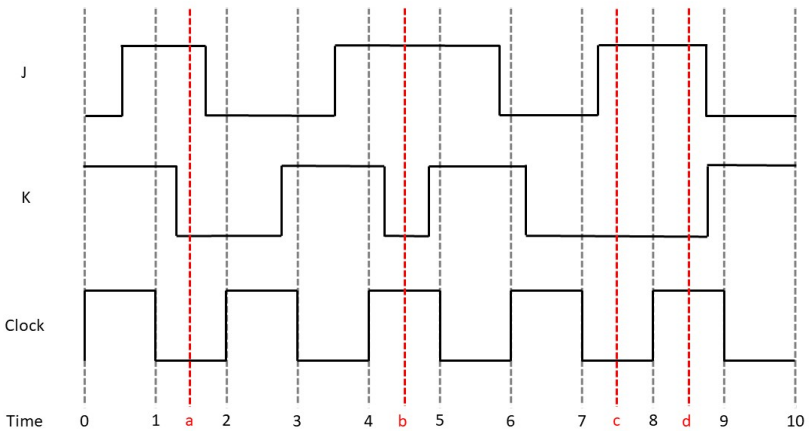
Answers:

- high
- low

Response Feedback: Well done!

Question 8

2 out of 2 points



For the above rising edge JK Flip Flop waveform, complete the following table for the output Q at the highlighted points in time a, b, c, and d:

Time	Q
a	**[a]**
b	**[b]**
c	**[c]**
d	**[d]**

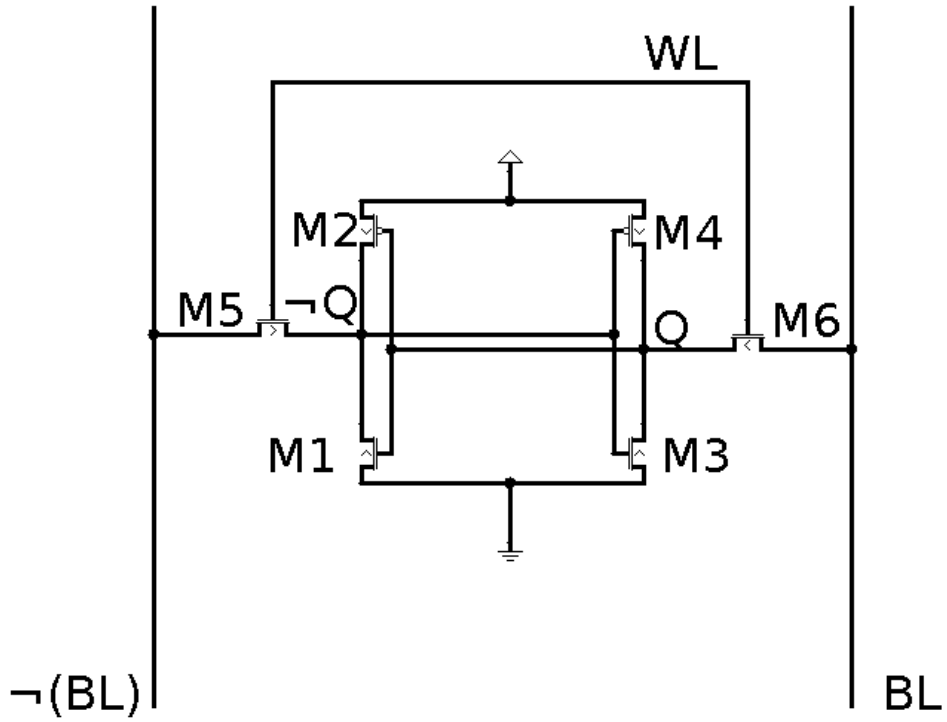
Answers:

- high
- low

Response Feedback: Well done!

Question 9

2 out of 2 points



Assume Q = 0, ¬Q = 1. What are the status of each transistor and the signals WL and BL in the above 6T SRAM circuit when we are writing 1 to Q and after ¬Q has become 0?

M1 is **[M1-on]**.

M2 is **[M2-off]**.

M3 is **[M3-off]**.

M4 is **[M4-on]**.

M5 is **[M5-on]**.

M6 is **[M6-on]**.

BL is **[BL-high]**.

WL is **[WL-high]**.

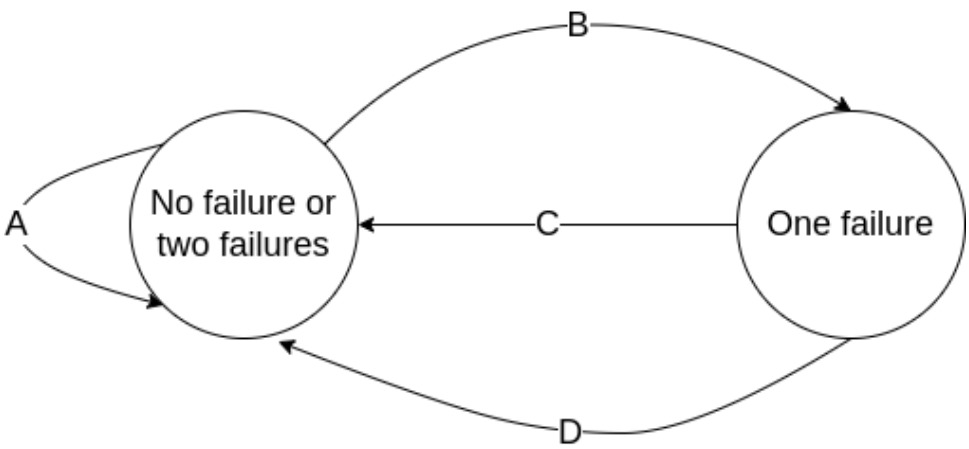
Answers:

- ON
- OFF
- HIGH
- LOW

Response Feedback: Well done!

Question 10

3 out of 3 points



Never fail to do a task twice in a row.
This FSM diagram depicts a system that receives "1" as an input to indicate the user failed to do their task and "0" to mean the user did not fail to do their task.
If the user fails to do two tasks in a row, the output should be "1". On the other hand, the output should be "0" for any other scenarios.
Suppose the user failed to do two tasks in a row, and the system produced "1" as an output; the first subsequent output should be "0" regardless of the input.

Complete the sentences that describe the inputs and outputs of the transitions A, B, C and D in this FSM with either value 0 or 1.

The input that triggers transition A is **[A_in]**, and the output produced by transition A is **[A_out]**.

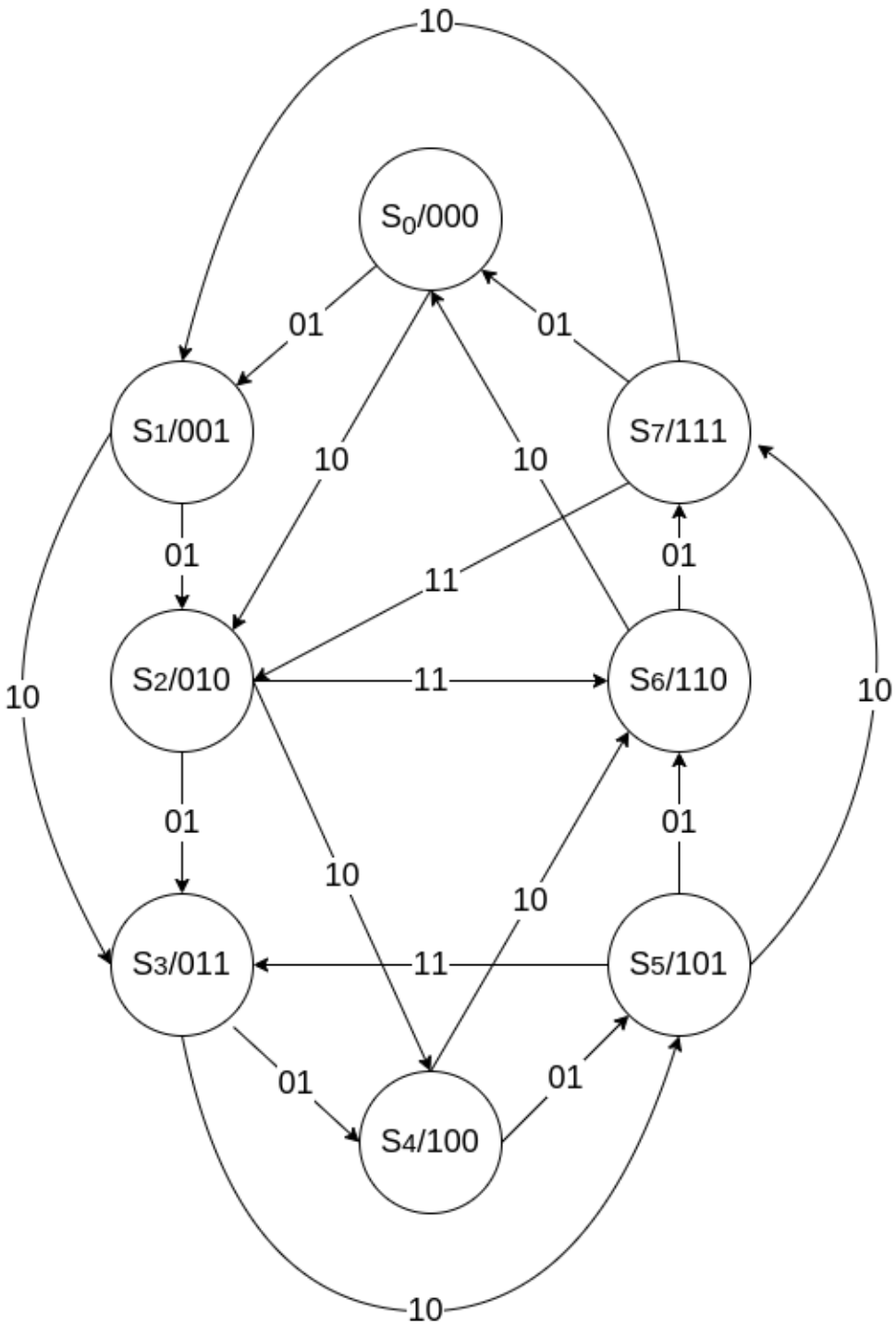
The input that triggers transition B is **[B_in]**, and the output produced by transition B is **[B_out]**.

The input that triggers transition C is "0", and the output produced by transition C is **[C_out]**.

The input that triggers transition D is **[D_in]**, and the output produced by transition D is "1."

Response Feedback: Well done!

Question 11 3 out of 3 points



Complete the transition table that captures the transitions of this FSM diagram. The empty cells are the inputs of row number 3, the bits of the current state and the inputs of row number 9, the bits of the next state of row number 12, and all the cells of row number 19.

No.	S2	S1	S0	Input1	Input0	S2'	S1'	S0'
1	0	0	0	0	1	0	0	1
2	0	0	1	1	0	0	1	1
3	0	0	1	**[1-1-2-i1-0]**	**[1-1-2-i0-1]**	0	1	0
4	0	1	1	1	0	1	0	1
5	0	1	0	0	1	0	1	1
6	0	1	0	1	0	1	0	0
7	0	1	0	1	1	1	1	0
8	0	0	0	1	0	0	1	0
9	**[3-1-4-s2-0]**	**[3-1-4-s1-1]**	**[3-1-4-s0-1]**	**[3-1-4-i1-0]**	**[3-1-4-i0-1]**	1	0	0
10	1	0	0	0	1	1	0	1
11	1	0	0	1	0	1	1	0
12	1	0	1	0	1	**[5-1-6-s2-prime-1]**	**[5-1-6-s1-prime-1]**	**[5-1-6-s0-prime-0]**
13	1	0	1	1	0	1	1	1
14	1	1	1	1	1	0	1	0
15	1	0	1	1	1	0	1	1
16	1	1	0	1	0	0	0	0
17	1	1	1	0	1	0	0	0
18	1	1	0	0	1	1	1	1
19	**[7-2-1-s2-1]**	**[7-2-1-s1-1]**	**[7-2-1-s0-1]**	**[7-2-1-i1-1]**	**[7-2-1-i0-0]**	**[7-2-1-s2-prime-0]**	**[7-2-1-s1-prime-0]**	**[7-2-1-s0-prime-1]**

Response Feedback: Well done1

Question 12

0 out of 3 points

Which of the logic functions F listed below is the minimum DNF formula that represents the output F from the inputs a,b,c,d, and e. Use K-map to find the optimised output formula from the below truth table.

a	b	c	d	e	F
0	0	1	0	0	1
0	1	0	1	0	1
0	1	1	1	0	1
1	1	0	1	0	1
1	1	1	1	0	1
1	0	0	1	0	1
1	0	1	1	0	1
1	0	1	0	0	1
0	0	1	0	1	1
0	1	0	1	1	1

0	1	1	1	1	1
1	1	0	1	1	1
1	1	1	1	1	1

Note that the entries which result in F being false have been omitted for brevity.

Answers:

$$F = bd + \bar{e}ad + \bar{e}bc\bar{d} + \bar{a}bc\bar{d}$$

$$F = \bar{e}bd + \bar{e}ad + \bar{e}bc\bar{d} + ebd + \bar{a}bc\bar{d}$$

$$F = \bar{e}bd + \bar{e}a\bar{b}d + \bar{e}bc\bar{d} + ebd + \bar{a}bc\bar{d}$$

$$F = bd + \bar{e}a\bar{b}d + \bar{e}bc\bar{d} + \bar{a}bc\bar{d}$$

$$F = \bar{e}bd + \bar{e}ad + \bar{e}bc\bar{d} + ebd + e\bar{a}bc\bar{d}$$

not listed here

Response Feedback: Please check the attached image, which describes the process of using K-maps to find the minimised DNF formula of F.

k-map.drawio (1).png

Friday, 4 November 2022 12:12:26 o'clock GMT

← OK