IN1006 Systems Architecture (PRD1 A 2022/23)

Started on	Thursday, 1 December 2022, 4:20 PM
State	Finished
Completed on	Thursday, 1 December 2022, 4:42 PM
Time taken	21 mins 41 secs
Grade	**8.90** out of 10.00 (**89**%)

Question **1**

Correct

Mark 1.00 out of 1.00

What is the difference in operation between a LOAD x and a LOADI x instruction?

Select one:

- a. The LOAD loads the value at address x to the AC; the LOADI loads the value found in the location addressed by the value in x to the AC ✔
- b. There is no difference if x is the same
- c. LOAD loads the value x to the AC; LOADI loads the value found at x to the AC
- d. The LOAD loads the value at address x to the AC; the LOADI loads the value x to the AC
- e. Don't know/No answer

Your answer is correct.

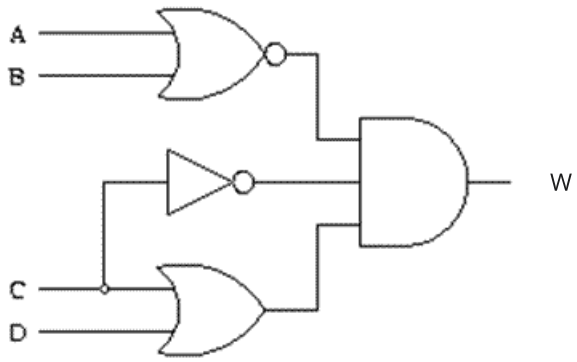
The correct answer is: The LOAD loads the value at address x to the AC; the LOADI loads the value found in the location addressed by the value in x to the AC

Question **2**

Correct

Mark 1.00 out of 1.00

Given the logic circuit (with output W) and table below, which line of the table does ***not*** correspond with the behaviour of the logic circuit?



Row	A	B	C	D	Z
1	0	0	0	0	0
2	0	0	0	1	1
3	0	0	1	0	0
4	0	0	1	1	0
5	0	1	0	0	0
6	0	1	0	1	0
7	0	1	1	0	0
8	0	1	1	1	1
9	1	0	0	0	0
10	1	0	0	1	0
11	1	0	1	0	0
12	1	0	1	1	0
13	1	1	0	0	0
14	1	1	0	1	0
15	1	1	1	0	0
16	1	1	1	1	0

Select one:

- a. Row 1
- b. Row 10
- c. Row 8 ✔
- d. Don't know/no answer
- e. Row 12
- f. Row 5
- g. Row 15
- h. Row 7
- i. Row 3

Row 8 is in error as all inputs to the AND gate must be one for W to be one, and this only occurs when the conditions in row two are met.

The correct answer is: Row 8

Question **3**

Correct

Mark 1.00 out of 1.00

Which MARIE instruction is being carried out by the following microoperations?

Select one:

- a. STORE Y ✔ Correct
- b. LOAD Y
- c. STORE AC+MAR
- d. Neither the above sequence nor any subsequence of it corresponds to a MARIE instruction.
- e. ADD Y

Your answer is correct.

The first microoperation assigns Y to MAR. The second microoperation assigns the value of AC to MBR, and the last microoperation stores the value of MBR to the memory word with the address indicated by MAR. Hence given microoperations correspond to the MARIE instruction STORE Y.

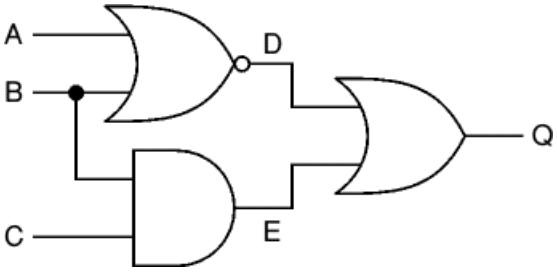
The correct answer is: STORE Y

Question **4**

Correct

Mark 1.00 out of 1.00

Given the logic circuit and table below (with output Q), which line of the table does ***not*** correspond to the behaviour of the logic circuit?



Row	A	B	C	Q
1	0	0	0	1
2	0	0	1	1
3	0	1	0	1
4	0	1	1	1
5	1	0	0	0
6	1	0	1	0
7	1	1	0	0
8	1	1	1	1

Select one:

- a. Row 4
- b. Row 7
- c. All rows are correct
- d. Row 6
- e. Row 1
- f. Row 8
- g. Row 2
- h. Don't know/no answer
- i. Row 3 ✔
- j. Row 5

Row 3 is in error as the output of the NOR-gate (D) and AND-gate (E) are zero, leading to an output of the OR-gate (Q) of zero.

The correct answer is: Row 3

Question **5**

Correct

Mark 1.00 out of 1.00

Which MARIE instruction is being carried out by the microoperations that follow?

$MAR \leftarrow X$
$MBR \leftarrow M[MAR]$
$AC \leftarrow MBR$

Select one:

- a. Add X
- b. Jump X
- c. Load X ✔
- d. Store X
- e. Don't know/No answer

Your answer is correct.

The correct answer is: Load X

Question **6**

Correct

Mark 1.00 out of 1.00

Which MARIE instruction is being carried out by the microoperation that follows?

$PC \leftarrow X$

Select one:

- a. Load X
- b. Don't know/No answer
- c. Jump X ✔
- d. Add X
- e. Store X

The correct answer is: Jump X

Question **7**

Correct

Mark 1.00 out of 1.00

Which of the following statements best describes the FDE cycle? FDE cycle is ...

Select one:

- a. Don't know/No response
- b. ...an important hardware technology used to build processors.
- c. ... part of the Input/Output subsystem of the von Neumann model.
- d. ...the series of steps that a computer carries out when it runs a program is the series of steps that a computer carries out when it runs a program is the series of steps that a computer carries out when it runs a program .
- e. ... loop instruction in MARIE architecture.

✔ This is correct.

Your answer is correct.

The correct answer is: ...the series of steps that a computer carries out when it runs a program is the series of steps that a computer carries out when it runs a program is the series of steps that a computer carries out when it runs a program .

Question **8**

Incorrect

Mark -0.10 out of 1.00

What is the effect of a bitwise-NOR operation on the following two 12-bit words: 1000 1010 1101, 0110 1110 0101?

Select one:

- a. 1110 0100 1000
- b. 0000 1100 0101
- c. 1110 1110 1101
- d. Don't know/no answers
- e. 1111 0011 1010
- f. 0001 0001 0010

✖

The NOR operation is applied to each of the pairs of bits at the same position in each word, moving from left to right.

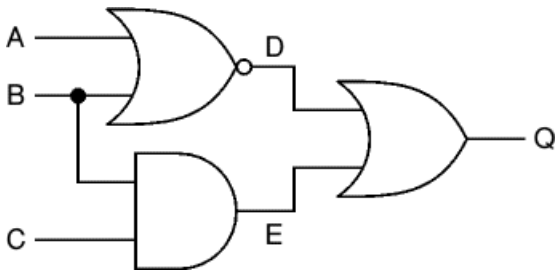
The correct answer is: 0001 0001 0010

Question **9**

Correct

Mark 1.00 out of 1.00

Which of the following is the correct Boolean expression for the logic circuit below (with output Q).



Select one:

- a. Q = (A+B)'(BC)
- b. Q = (A+B)' + (BC) ✔
- c. Q = (AB)' + (B+C)
- d. Q = (A+B) + (BC)

- e. Don't know/no answer

Output Q is OR of a NOR-gate (D) with inputs A, B and an AND-gate (E) with inputs B, C. This gives the expression:
Q = (A+B)' + (BC)

The correct answer is: Q = (A+B)' + (BC)

Question **10**

Correct

Mark 1.00 out of 1.00

Which of the following equations correctly reflects the truth table shown below? A,B and C are inputs and F is the output.

A	B	C	F
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

Select one:

- a. None of these expressions
- b. F = AB'C + A'BC' + A'BC' + A'B'C + A'B'C'
- c. F = (A'BC ' + A'BC + AB'C' + ABC' + ABC)'
- d. Don't know/no answer
- e. F = A'BC' + A'BC + AB'C' + ABC' + ABC ✔
- f. F = (AB'C + A'BC' + A'BC' + A'B'C + A'B'C')'

The F output is given as a sum-of-products expression where each product (AND) should correspond to a row where F = 1.

The correct answer is: F = A'BC' + A'BC + AB'C' + ABC' + ABC

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