IN1006 Systems Architecture (PRD1 A 2022/23)

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State	Finished
Completed on	Thursday, 1 December 2022, 3:46 PM
Time taken	5 mins 13 secs
Grade	10.00 out of 10.00 (100%)

Question 1

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

Your answer is correct.

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

Question 2

Correct

Mark 1.00 out of 1.00

How many components of MARIE architecture can use the bus simultaneously?

Select one:

- a. Don't Know/No answer
- b. 3 components
- c. 2 components
- d. 1 component ✔
- e. All components

Your answer is correct.

The correct answer is: 1 component

Question 3

Correct

Mark 1.00 out of 1.00

Which of the following pair of values usually make up an instruction in a simple instruction set?

Select one:

- a. Operand, Address
- b. Don't know/No answer
- c. Operation, Instruction Length
- d. OpCode, Address ✔
- e. Operation, FDE

Your answer is correct.

The correct answer is: OpCode, Address

Question 4

Correct

Mark 1.00 out of 1.00

Consider the following MARIE code. The code starts at address 000: the first instruction is saved at address 000.

After the execution of this code what is the value (in decimal) stored in the OutREG register?

```
If,     Load X
        Subt Y
        Skipcond 400
        Jump Else
Then,   Load X
        Add Z
        Output
        Jump Endif
Else,   Load X
        Subt Z
        Output
Endif,  Halt
X,      Dec 7
Y,      Dec 5
Z,      Dec 2
```

Select one:

- a. 7
- b. 3
- c. 1
- d. Don't know/No answer
- e. 5 ✔

This program executes the "If, then, else" statement using the Skipcond instruction. In this case, the condition in Skipcond is set to 400 and so IR[11-10] is 01. So, the statement (if AC=0 then PC=PC+1) is evaluated and the "Else" part of the code is executed since AC equals to 2. The program then continues to execute and the "Output" instruction outputs the value of OutREG and OutREG=AC and AC is X-Z=5 and terminates at "Halt". So the answer is 5.

The correct answer is: 5

Question 5

Correct

Mark 1.00 out of 1.00

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

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

Select one:

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

The correct answer is: Store X

Question 6

Correct

Mark 1.00 out of 1.00

What is the effect of a bitwise-NAND operation on the following two 12-bit words: 1000 1010 1101, 0110 1110 0101 ?

Select one:

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

Your answer is correct.

The NAND 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: 1111 0101 1010

Question 7

Correct

Mark 1.00 out of 1.00

What is the effect of a bitwise-NAND operation on the following two 12-bit words: 1000 1010 1101, 0110 1110 0101 ?

Select one:

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

The NAND 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: 1111 0101 1010

Question 8

Correct

Mark 1.00 out of 1.00

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

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

Select one:

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

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 9

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

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

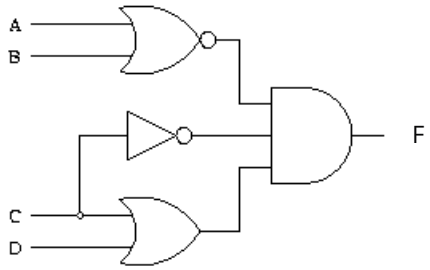
The correct answer is: F = A'BC' + A'BC + AB'C' + ABC' + ABC

Question 10

Correct

Mark 1.00 out of 1.00

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



Select one:

- a. Don't know/no answer
- b. F= (A+B)'C(C+D)
- c. F= A+B'C'(C+D)
- d. F= (A+B)'C'(C+D)'
- e. F= (A+B)'C'(C+D) ✔

The output is one if all three of its inputs are one (AND). The first of these is NOR of inputs A, B. The second NOT C and there third C OR D. This gives the expression: F= (A+B)'C'(C+D)

The correct answer is: F= (A+B)'C'(C+D)

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