IN1006 Systems Architecture (PRD1 A 2022/23)

Started on	Thursday, 1 December 2022, 5:26 PM
State	Finished
Completed on	Thursday, 1 December 2022, 5:50 PM
Time taken	24 mins 33 secs
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

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

Your answer is correct.

The correct answer is: OpCode, Address

Consider the following MARIE program. What is the outcome of the program?

```
            Clear
            Add X
            Store Sum
LoopC,      Skipcond 800
            Jump LoopEnd
Loop,       Output
            Subt Y
            Jump LoopC
LoopEnd,    Halt
X,          Dec 10
Y,          Dec 4
Sum,        Dec 0
```

Select one:

- a.   The program will compute the expression 10+6+2 (i.e., 18) before ending.
- b.   The program will compute the expression 10, 8, 6, 4 and 2 before ending.
- c.   The program will output 4 for three consecutive times before ending.
- d.   The program will output the decimal numbers 10, 8, 6, 4, 2 and 0 before ending.
- e.   The program will output the decimal numbers 10, 6 and 2 before ending.   ✔

This program executes a "Loop" using the Skipcond instruction. In this case, the condition in Skipcond is set to 10 and so IR[11-10] is 10. Thus, if AC>0 then PC will become PC+1 and the execution will continue from "Loop" . Otherwise, the execution will continue from "LoopEnd". Initially (after the execution of the first two statements) the AC will be 10 (>0) and thus the instruction at the position "Loop" will be executed outputing 10 (i.e., the current value of AC). Then 4 will be subtracted from AC and the execution will continue from LoopC (due to the "Jump LoopC" instruction). This time the AC will be 6 so the evaluation of Skipcond will make the program continue from "Loop" again, this time outputing 6 first and then subtracting 4 from it. This will continue until AC becomes -2, at which point the program execution will jump to "LoopEnd" and will be halted. Thus, the program will output the values 10, 6, and 2 before halting.

The correct answer is: The program will output the decimal numbers 10, 6 and 2 before ending.

Which of the following statements is *the most accurate* description for the sum-of-products expression below?

F = A'BC + ABC' + AB'C'

Select one:

- ○ a.   Don't know/no answer.
- ○ b.   The truth table has two rows where F = 1 and no zeros need to be in the inputs to return one.
- ○ c.   The truth table has three rows where F = 1 and no zeros need to be in the inputs to return one.
- ◉ d.   The truth table has three rows where F = 1 and at least one zero must be in the inputs to return one. ✔
- ○ e.   The truth table has three rows where F = 1 and B must be one to return one.
- ○ f.   The truth table has four rows where F = 1 and no zeros need to be in the inputs to return one.

Your answer is correct.

The number of OR-ed terms above specifies the number of input cases that lead to a true expression (rows of truth table that give F = 1). Each of the inverted variables shows where the input needs to be zero for that input case.

The correct answer is: The truth table has three rows where F = 1 and at least one zero must be in the inputs to return one.

Which of the following statements is *the most accurate* description for the sum-of-products expression below?

$$F = A'B'C + A'BC' + AB'C'$$

Select one:

- ◉ a.   The truth table has three rows where F = 1 and no more than two zeros must be in the inputs to return one. ✔
- ○ b.   The truth table has two rows where F = 1 and C must be zero to return one.
- ○ c.   The truth table has four rows where F = 1 and no more than two zeros must be in the inputs to return one.
- ○ d.   Don't know/no answer
- ○ e.   The truth table has three rows where F = 1 and C must be one to return one.
- ○ f.   The truth table has three rows where F =1, and no zeros need to be in the inputs to return one.

The number of OR-ed terms above specifies the number of input cases that lead to a true expression (rows of truth table that give F = 1). Each of the barred variables shows where the input needs to be zero for that input case.

The correct answer is: The truth table has three rows where F = 1 and no more than two zeros must be in the inputs to return one.

Consider the following MARIE program. What is the outcome of the program?

```
            Clear
            Add X
            Store Sum
LoopC,      Skipcond 800
            Jump LoopEnd
Loop,       Output
            Subt Y
            Jump LoopC
LoopEnd,    Halt
X,          Dec 10
Y,          Dec 2
Sum,        Dec 0
```

Select one:

○ a.   The program will output 2 for five consecutive times before ending.

○ b.   The program will compute the expression 10, 9, 8, 7 and 6 before ending.

○ c.   The program will output the decimal numbers 10, 8, 6, 4, 2 and 0 before ending.

○ d.   The program will compute the expression 10+8+6+4+2 (i.e., 30) before ending.

◉ e.   The program will output the decimal numbers 10, 8, 6, 4 and 2 before ending.   ✔

This program executes a "Loop" using the Skipcond instruction. In this case, the condition in Skipcond is set to 10 and so IR[11-10] is 10. Thus, if AC>0 then PC will become PC+1 and the execution will continue from "Loop" . Otherwise, the execution will continue from "LoopEnd". Initially (after the execution of the first two statements) the AC will be 10 (>0) and thus the instruction at the position "Loop" will be executed outputing 10 (i.e., the current value of AC). Then 2 will be subtracted from AC and the execution will continue from LoopC (due to the "Jump LoopC" instruction). This time the AC will be 8 so the evaluation of Skipcond will make the program continue from "Loop" again, this time outputing 8 first and then subtracting 2 from it. This will continue until AC becomes 0, at which point the program execution will jump to "LoopEnd" and will be halted. Thus, the program will output the values 10, 8, 6, 4 and 2 before halting.
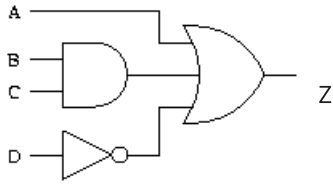
The correct answer is: The program will output the decimal numbers 10, 8, 6, 4 and 2 before ending.

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

Select one:

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

Input D feeds directly into a NOT gate so is inverted to D'. Inputs B and C are AND-ed together. Then all are OR-ed together with A to give the expression:

$$Z = A + (BC) + D'$$

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

Which of the following statements is *the most accurate* description for the sum-of-products expression below?

 F = A'BC + ABC' + AB'C'

Select one:

- a. The truth table has three rows where F = 1 and at least one zero must be in the inputs to return one.   ✔
- b. The truth table has three rows where F = 1 and no zeros need to be in the inputs to return one.
- c. The truth table has four rows where F = 1 and no zeros need to be in the inputs to return one.
- d. The truth table has three rows where F = 1 and B must be one to return one.
- e. The truth table has two rows where F = 1 and no zeros need to be in the inputs to return one.
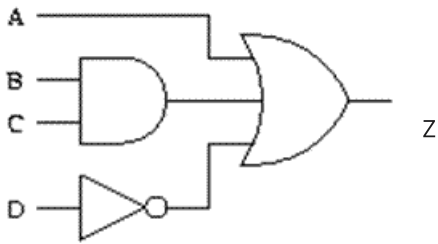- f. Don't know/no answer.

Your answer is correct.

The number of OR-ed terms above specifies the number of input cases that lead to a true expression (rows of truth table that give F = 1). Each of the inverted variables shows where the input needs to be zero for that input case.

The correct answer is: The truth table has three rows where F = 1 and at least one zero must be in the inputs to return one.

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

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

Select one:
- a. Row 13
- b. Row 1
- c. Row 3
- d. Row 10
- e. Don't know/no answer
- ○ f. Row 15 ✔
- g. Row 11
- h. Row 7
- i. Row 6

Row 15 is in error as since A is an input to the final OR-gate and Z should be one when A is one.

The correct answer is: Row 15

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

Select one:

- a. ... loop instruction in MARIE architecture.
- b. ...an important hardware technology used to build processors.
- c. Don't know/No response
- d. ... part of the Input/Output subsystem of the von Neumann model.
- e. ...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

  .

✔ 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
.

Consider the following MARIE code. What does this code do?

```
If,      Load X
         Subt Y
         Skipcond 400
         Jump Else
Then,    Load X
         Add X
         Output
         Jump Endif
Else,    Load Y
         Subt X
         Store Y
Endif,   Halt
X,       Dec 10
Y,       Dec 10
```

Select one:

○ a.   It will outputs the hexadecimal value 10 and terminate.

○ b.   It will store the hexadecimal value 20 in the memory address X and terminate.

○ c.   It will store the hexadecimal value 5 and terminates.

◉ d.   It will output the decimal value 20 and terminate.   ✔

○ e.   It will compute and store the decimal value 20 and terminate.

This program executes an "If, then, else" statement using the Skipcond instruction. In this case, the condition in Skipcond is 01. So, PC will become PC+1 if AC=0 and the "Then" part of the code will be executed. If AC <> 0 then the "Else" part of the code will be executed. After the execution of the first two statements, AC will be 0, so the "Then" part of the code will be executed. So the program will compute X+X=20, will output this value and will terminate.

The correct answer is: It will output the decimal value 20 and terminate.

Jump to...

Quiz navigation

Show one page at a time

Finish review