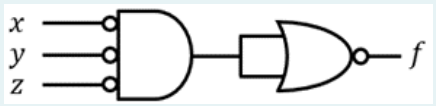
Started on	Thursday, 4 January 2024, 6:00 PM
State	Finished
Completed on	Thursday, 4 January 2024, 6:30 PM
Time taken	29 mins 55 secs
Grade	**11.00** out of 12.00 (**91.67**%)

Question **1**

Correct

Mark 1.00 out of 1.00

The following circuit is equivalent to:



- a. 3-input **OR** gate ✔
- b. 3-input **NAND** gate
- c. 3-input **XNOR** gate
- d. 3-input **AND** gate
- e. 3-input **NOR** gate

Question **2**

Correct

Mark 1.00 out of 1.00

Given the Boolean function **F(W, X, Y, Z) = ∏(0, 1, 2, 5, 8, 9, 10)**, which of the following is ***not*** a **Prime Implicant** of **F** ?

- a. YZ
- b. XY
- c. XZ'
- d. None ✔
- e. WX

Question **3**

Correct

Mark 1.00 out of 1.00

Which of the following expressions is **not** *equivalent* to **X'** ?

a. **X** XOR **1**

b. **X** NAND **X**

c. **X** NOR **1** ✔

d. **X** NOR **X**

e. **X** NAND **1**

Question **4**

Correct

Mark 1.00 out of 1.00

The Boolean function **F(A, B, C, D) = A ⊕ B ⊕ C ⊕ D = 1** *means*:

a. Half of the inputs are zeros (for example: A = 0, B = 0, C = 1, D = 1)

b. All inputs are zeros (A = 0, B = 0, C = 0, D = 0)

c. One or three of the inputs are ones ✔

d. All inputs are ones (A = 1, B = 1, C = 1, D = 1)

e. One or two or three of the inputs are ones

Question **5**

Correct

Mark 1.00 out of 1.00

Given the following *K-map* of the Boolean function **F(W, X, Y, Z)**:

WX \ YZ	00	01	11	10
00	1	1	0	1
01	1	X	X	1
11	0	X	X	0
10	1	1	0	0

Which of the following is an ***Essential Prime Implicant*** of **F** ? **(Select all that apply)**

- a. W'X
- b. W'Z' ✔
- c. X'Y' ✔
- d. Y'Z
- e. W'Y'

Question **6**

Correct

Mark 1.00 out of 1.00

The minimum product-of-sums **(POS)** expression for the Boolean function **G(A, B, C, D)** subject to the ***don't care conditions*** given in the following *K-map* is**:**

AB \ CD	00	01	11	10
00	X	1		
01	1	1	X	1
11	1	X	X	
10		1		X

- a. G(A, B, C, D) = (B + D) · (A' + C') · (C' + D') ✔
- b. None
- c. G(A, B, C, D) = (B' + C) · (A + B') · (C + D')
- d. G(A, B, C, D) = (B' + D') · (A + C) · (B' + C)
- e. G(A, B, C, D) = (B + D) · (A' + C') · (B + C') · (C' + D')

Question **7**

Correct

Mark 1.00 out of 1.00

A communication system for binary-coded decimal (**BCD**) **codes** uses *even parity* for error detection. Assume the sender wants to ***send*** the two numbers: **9** and **7**. Then, the sender ***transmits***:

(**Note:** In this communication system, the parity bit is padded/added for every transmitted BCD digit)

- a. 01001 10111 ✔
- b. 1 1001 0111
- c. 11001 00111
- d. 1001 0111
- e. 0 1001 0111

Question **8**

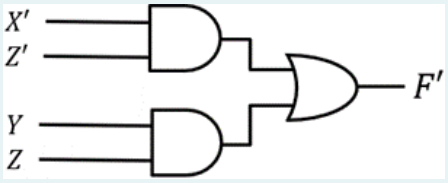
Correct

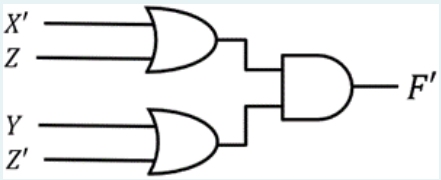
Mark 1.00 out of 1.00

Consider the following *K-map* of the Boolean function **F(W, X, Y, Z)**:

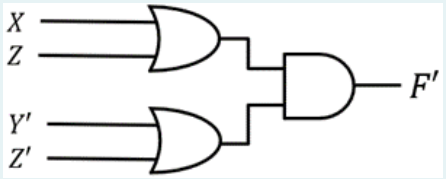
WX \ YZ	00	01	11	10
00	0	1	0	0
01	1	1	0	1
11	1	1	0	1
10	0	1	0	0

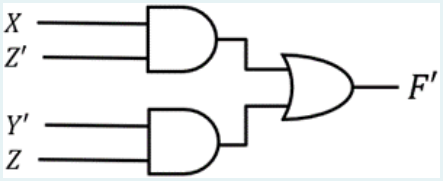
The gate-level implementation for the **simplified *complement*** of **F** expressed as sum-of-products **(SOP)** is:

a. 

b. 

c. None

d. 

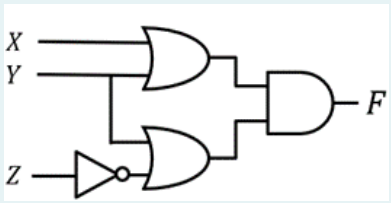
e. 

Question **9**

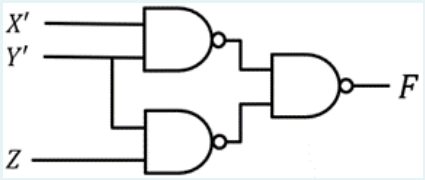
Correct

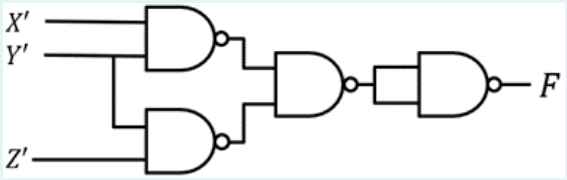
Mark 1.00 out of 1.00

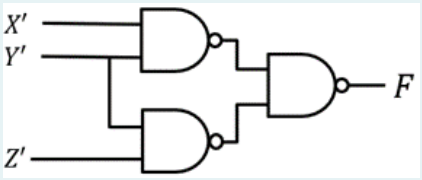
Given the following circuit diagram with *AND/OR/NOT* gates:

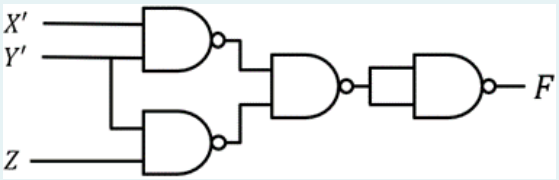


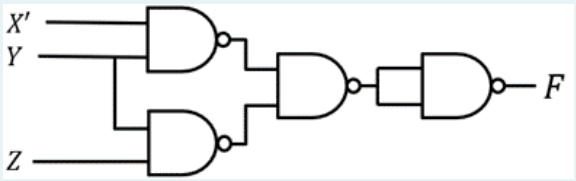
The *equivalent* **NAND** gates only *implementation* of the above circuit is:

a. 

b. 

c. 

d. 

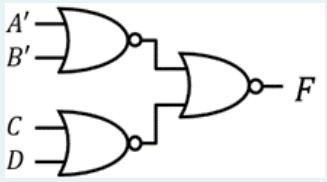
e. 

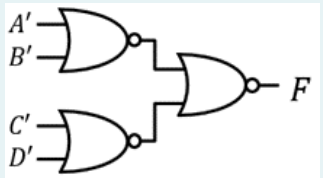
Question **10**

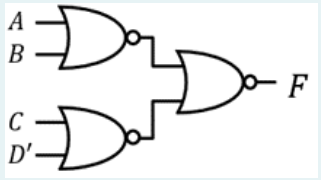
Correct

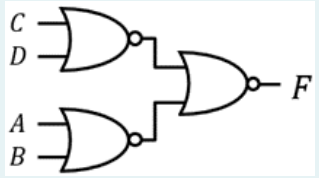
Mark 1.00 out of 1.00

The implementation of Boolean function **F(A, B, C, D) = (A + B) · (C' · D')'** using ***NOR*** gates only is:

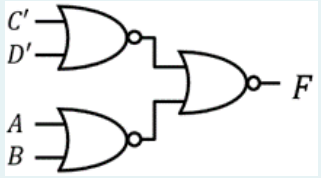
a. 

b. 

c. 

d. 

✔

e. 

Question **11**

Incorrect

Mark 0.00 out of 1.00

Consider the Boolean function **F(W, X, Y, Z) = ∑(0, 1, 2, 4, 6, 10, 12)** which has the don't care conditions **D(W, X, Y, Z) = ∑(7, 13, 14, 15)**, the minimum sum-of-products (**SOP**) expression of **F** is:

a. F(W, X, Y, Z) = W'X'Y' + W'Z' + XZ' + YZ'

b. F(W, X, Y, Z) = W'X'Y' + W'Z' + XZ'

c. F(W, X, Y, Z) = W'X'Y' + W'Z' + YZ'

d. F(W, X, Y, Z) = W'X'Y' + XZ' + YZ'

e. F(W, X, Y, Z) = W'X'Y' + WX + XZ' + YZ' ✖

Question **12**

Correct

Mark 1.00 out of 1.00

Consider the circuit with the following *truth table*. The circuit has three inputs; **A**, **B**, and **C**. The output **Z** = _____

A	B	C	Z
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

a. None

b. B'C' + BC'

c. B'

d. BC + B'C

e. C' ✔