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OVERALL ANALYSIS   COMPARISON REPORT   **SOLUTION REPORT**

ALL(17)   CORRECT(5)   INCORRECT(5)   SKIPPED(7)

Q. 1

Which one of the following statement is true when the function is having cyclic prime implicant K-map?

FAQ | ▶ Solution Video | Have any Doubt ?

A
Two minimal forms with one common prime implicant.

B
Two minimal forms with two common prime implicant.

C
Two minimal forms with no common prime implicant

Correct Option

Solution :
(c)

D
None of the above

QUESTION ANALYTICS

Q. 2

If the value of X + Y = 1, then the value of $X \oplus Y$ is equal to

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A
X

B
$\overline{X} + \overline{Y}$

Correct Option

Solution :
(b)

$$X \oplus Y = \overline{X \odot Y} = \overline{\overline{X}\,\overline{Y} + XY}$$
$$= \overline{(\overline{X}\overline{Y})}\,\overline{(XY)}$$
$$= (X + Y)\,(\overline{X} + \overline{Y})$$
$$= \overline{X} + \overline{Y} \qquad (\because \ X + Y = 1 \text{ which is given})$$

C
1

Your answer is Wrong

D
0

QUESTION ANALYTICS

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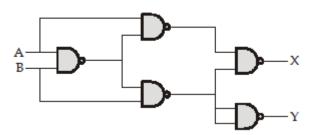
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Consider the circuit shown below:

Then, which of the following statement is true.

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A

When A = 1 and B = 1, Output X = 0 and Y = 1

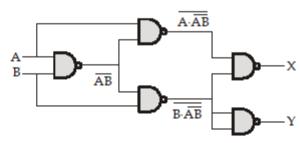Your answer is **Wrong**

B

When A = 1 and B = 0, Output X = 0 and Y = 1

C

When A = 0 and B = 1, Output X = 1 and Y = 1

Correct Option

Solution :
(c)

$$X = \overline{B}(A+B) + \overline{A}(A+B)$$
$$= A\overline{B} + \overline{A}B = A \oplus B$$
$$Y = B(\overline{AB})$$
$$= B(\overline{A} + \overline{B}) = \overline{A}B$$

The above circuit represents a half subtracter constructed using only NAND gates. Thus the table can be written as

A	B	Difference (X)	Difference (Y)
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

D

When A = 0 and B = 0, Output X = 1 and Y = 0

QUESTION ANALYTICS

Q. 4

The minimum number of 2 × 1 MUX required to implement a half-subtracter circuit when only basic inputs 0, 1, A and B are available is
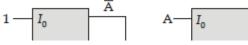
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A
3

Your answer is **Correct**

Solution :
(a)

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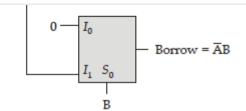
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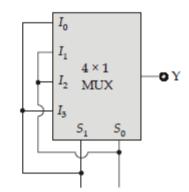

$0 \longrightarrow I_0$

$Borrow = \overline{A}B$

$I_1 \quad S_0$

B

B
4

C
5

D
6

QUESTION ANALYTICS

Q. 5

A gate have two inputs (A, B) and one output (Y) is implemented using a 4 × 1 MUX as shown in the figure below:

If the function 'Y' = B then the select line will be:

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A

$S_0 = \underline{B}, \ S_1 = A$

Your answer is **Correct**

Solution :
(a)
By taking $S_0 = B$, $S_1 = A$

$$Y = (A)\overline{A}\overline{B} + (B)\overline{A}B + (B)A\overline{B} + (A)AB$$
$$= \overline{A}B + AB = B$$

B

$S_0 = A, \ S_1 = \overline{B}$

C

$S_0 = \overline{A}, \ S_1 = B$

D

$S_0 = \overline{A}, \ S_1 = \overline{B}$

QUESTION ANALYTICS

Q. 6

The minimum decimal equivalent of the number $(1AC)_X$ is equal to _____.

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Solution :
(311)
According to the given number, the least value of 'x' can be
$$'12 + 1' = 13$$
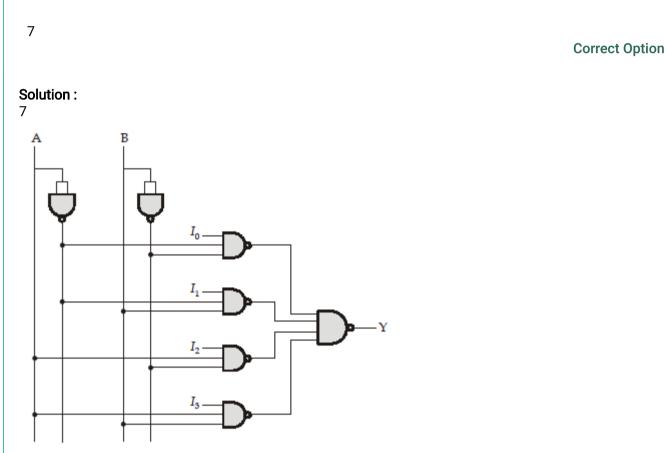Therefore, the least decimal equivalent
$$= (13)^2 + 10 \times 13 + 12 = 311$$

QUESTION ANALYTICS

Q. 7

The total number of NAND gates required to implement a 4 × 1 multiplexer is (assuming a NAND gates of any number of inputs are available) _____.

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7

Correct Option

Solution :
7

QUESTION ANALYTICS

Q. 8

Consider, the Karnaugh map given below, where x represents "dont care" in function $f(w, x, y,$

yz \ wx	00	01	11	10
00	1			
01	1	1	x	
11		x	1	1
10				1

Total number of essential prime implicants are _____.

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3

Correct Option

Solution :
3

Here 3 essential prime implicants are presents, while 5 prime implicants are presents.

Your Answer is 2

QUESTION ANALYTICS

Q. 9

If a Boolean function is having cyclic prime implicants K-map, then the number of minimal forms for function is _____.
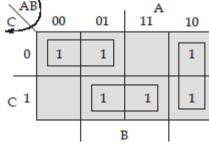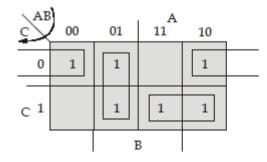
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2

Correct Option

Solution :
2

Example: $F(A, B, C) = \sum m(0, 2, 3, 4, 5, 7)$

$F(A, B, C) = \overline{A}\,\overline{C} + BC + \overline{A}B$ 　　　 $F(A, B, C) = \overline{B}\,\overline{C} + \overline{A}B + AC$

F(A, B, C) is having cyclic PI K-map and it is having '2' minimal forms.
In general, based on above example when the Boolean function is having cyclic prime implic
K-map it will be having 2 minimal forms.

QUESTION ANALYTICS

Q. 10

Let A, B and C are Boolean variables, then which of the following is true?

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A

$$(\overline{\overline{A}B + \overline{C}})(A + C) = (A + \overline{B})C$$

B

$$\overline{(A + \overline{B} + \overline{C})(A + \overline{BC})} = \overline{A}(B + \overline{C})$$

Your answer is Wrong

C

$$(A + \overline{A}\,\overline{B}\,\overline{C})B + \overline{A}B = BA + \overline{A}B$$

D

All of the above

Correct Option

Solution :
(d)

$$AC + A\overline{B}C + \overline{B}C = (A + \overline{B})C$$
$$AC + \overline{B}C = (A + \overline{B})C$$
$$(A + \overline{B})C = (A + \overline{B})C \quad \therefore \text{True}$$

(b) $\overline{(A + \overline{B} + \overline{C})(A + \overline{B}C)} = \overline{A}(B + \overline{C})$

$$(\overline{A}BC) + \overline{A}(B + \overline{C}) = \overline{A}B + \overline{A}\overline{C}$$
$$\overline{A}BC + \overline{A}B + \overline{A}\overline{C} = \overline{A}B + \overline{A}\overline{C}$$
$$\overline{A}B(C + 1) + \overline{A}\overline{C} = \overline{A}B + \overline{A}\overline{C}$$
$$\overline{A}\overline{C} + \overline{A}B = \overline{A}B + \overline{A}\overline{C} \quad \therefore \text{True}$$

(c) $(A + \overline{A}\overline{B}\overline{C})B + \overline{A}B = BA + \overline{A}B$

$$(A + \overline{B}\overline{C})B + \overline{A}B = (A + \overline{A})B$$
$$AB + \overline{A}B = B$$
$$B(A + \overline{A}) = B$$
$$B = B \quad \therefore \text{True}$$

So, all the expression are correct.

QUESTION ANALYTICS

Q. 11

Let $X = X_2X_1X_0$ and $Y = Y_1Y_0$ be unsigned positive 3-digit and 2-digit numbers respectively. The output function 'f' = 1 only when $X > Y$ otherwise '0'. Then the value of output f is equal to

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A

$$(X_2 + Y_1 + Y_0)(X_2 + \overline{X}_1 + \overline{Y}_0)(X_2 + X_1 + \overline{Y}_1)(X_2 + X_1 + X_0)(X_2 + X_0 + \overline{Y}_1)$$

B

$$(X_2 + \overline{Y}_1 + \overline{Y}_0)(X_2 + X_1 + \overline{Y}_0)(X_2 + \overline{X}_1 + Y_1)(X_2 + X_1 + X_0)(X_2 + X_0 + \overline{Y}_1)$$

C

$$(X_2 + \overline{Y}_1 + \overline{Y}_0)(X_2 + X_1 + \overline{Y}_0)(X_2 + X_1 + \overline{Y}_1)(X_2 + X_1 + X_0)(X_2 + X_0 + \overline{Y}_1)$$
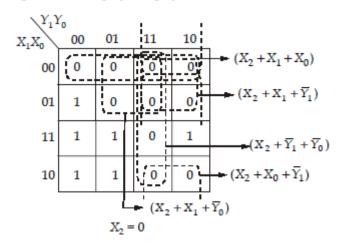
Correct Option

Solution :
(c)
Now, $X > Y$ if
(a) $X_2 = 1$
(b) $X_2 = 0$ and $X_1X_0 > Y_1Y_0$

D

$$(X_2 + \overline{Y}_1 + \overline{Y}_0)(X_2 + \overline{X}_1 + \overline{Y}_0)(X_2 + X_1 + \overline{Y}_1)(X_2 + \overline{X}_1 + \overline{X}_0)(X_2 + X_0 + \overline{Y}_1)$$

QUESTION ANALYTICS

Consider the function $F = A(\overline{A} + B)(\overline{A} + B + \overline{C})$, where F is a function in three Boolean variable A, B and C and $\overline{A}, \overline{C}$ are complement of variable A and C. Consider the following statements:

$S_1 : F = \Sigma(6, 7)$
$S_2 : F = \Sigma(0, 1, 2, 3, 4, 5)$
$S_3 : F = \Pi(0, 1, 2, 3, 4, 5)$
$S_4 : F = \Pi(6, 7)$

Which of the following is true?

Solution Video | Have any Doubt ?

A
$S_1 = $ true, $S_2 = $ false, $S_3 = $ false, $S_4 = $ true

B
$S_1 = $ false, $S_2 = $ true, $S_3 = $ false, $S_4 = $ true

C
$S_1 = $ true, $S_2 = $ false, $S_3 = $ true, $S_4 = $ false

Your answer is **Correct**

Solution :
(c)

$$F = A(\overline{A} + B)(\overline{A} + B + \overline{C})$$
$$= (A + B\overline{B} + C\overline{C})(\overline{A} + B + C\overline{C})(\overline{A} + B + \overline{C})$$
$$= (A + B + C)(A + B + \overline{C})(A + \overline{B} + C)(A + \overline{B} + \overline{C})(\overline{A} + B + C)(\overline{A} + B + \overline{C})$$

POS (F) $= M_0, M_1, M_2, M_3, M_4, M_5$
$= \Pi(0, 1, 2, 3, 4, 5)$

So, SOP (F) $= (0, 1, 2, 3, 4, 5, 6, 7) - (0, 1, 2, 3, 4, 5)$
$= \Sigma(6, 7)$

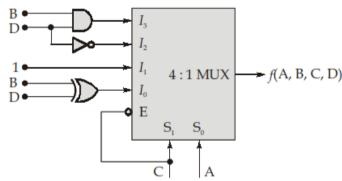So, $F = \Sigma(6, 7)$ and $F = \Pi(0, 1, 2, 3, 4, 5)$

D
$S_1 = $ false, $S_2 = $ true, $S_3 = $ true, $S_4 = $ false

QUESTION ANALYTICS

Q. 13

Identify the function $f(A, B, C, D)$, which is realised by the given 4 × 1 multiplexer circui

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A
$f = \Sigma m(0, 4, 8, 9, 12, 13)$

B
$f = \Sigma m(1, 4, 8, 9, 12, 13)$

Your answer is **Correct**

Solution :
(b)

$S_1 = C]$

$$I_2 = D$$
$$E = C$$
$$I_1 = 1$$
$$I_3 = BD$$

Mux output is

$$Y = \left[\bar{S}_1\bar{S}_0 I_0 + \bar{S}_1 S_0 I_1 + S_1 \bar{S}_0 I_2 + S_1 S_0 I_3\right]\bar{E}$$

Substituting the values

$$f(A, B, C, D) = \left[\bar{C}\bar{A}(B\oplus D) + \bar{C}A(1) + C\bar{A}(\bar{D}) + CA(BD)\right]\bar{C}$$

$$= \bar{C}\bar{A}(\bar{B}D + B\bar{D}) + \bar{C}A$$

$$= \bar{A}\bar{B}\bar{C}D + \bar{A}B\bar{C}\bar{D} + A\bar{C}$$
$$\quad\quad 1 \quad\quad\quad 4 \quad\quad (8,9,12,13)$$

$$= \Sigma m(1, 4, 8, 9, 12, 13)$$
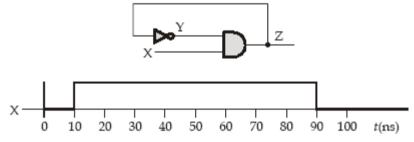

C

$f = \Sigma m(1, 4, 8, 9, 12, 15)$

D

None of the above

QUESTION ANALYTICS

Q. 14

Assume that the inverter in the network below has a propagation delay of 5 ns and the AND gate has a propagation delay of 10 ns. Draw a timing diagram for the network showing X, Y and Z. Assume Y is initially 1 and X waveform is given. Then the number of points where level changes is (excluding at t = 0 ns if any) at output Z till t = 100 ns is

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A

6

Correct Option

Solution :
(a)

Level changes at points are $t = 20, 35, 50, 65, 80, 95$ ns

B

7

C

these

Q. 15

Consider the following arithmetic equation:

$$\frac{302}{20} = 12.1$$

The minimum possible non-zero base for the given system is _____.

Solution Video | Have any Doubt ?

4

Your answer is **Correct** 4

Solution :
4

Let the base be 'x'. Thus the decimal equivalent can be written as,

$$\frac{3x^2 + 2}{2x} = x + 2 + \frac{1}{x}$$
$$3x^2 + 2 = 2x^2 + 4x + 2$$
$$x^2 - 4x = 0$$
$$x(x - 4) = 0$$
$$\therefore \quad x = 0 \text{ and } x = 4$$

Since, we require non-zero number, thus $x = 4$.

Q. 16

The number of minterms after minimizing the following Boolean expression is _____.
$$[D' + AB' + A'C + AC'D + A'C'D]'$$

Solution Video | Have any Doubt ?

1

Correct Option

Solution :
1

$$[D' + AB' + A'C + AC'D + A'C'D]'$$
$$= [D' + AC'D + AB' + A'C + A'C'D]'$$
$$= [D' + AC' + AB' + A'[C + C'D]]'$$
$$= [D' + AC' + AB' + A'[C + D]]'$$
$$= [D' + AC' + AB' + A'C + A'D]'$$
$$(\because \quad D' + A'D = D' + A')$$
$$= [D' + A' + AC' + AB' + A'C]'$$
$$(\because A' + A'C = A')$$
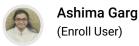$$(\because A' + AC' + AB' = A'+A(C'+B') = A' + C' + B')$$
$$= [D' + A' + C' + B']'$$
$$= ABCD$$

Hence, only 1 minterm is required.

Your Answer is 4

Q. 17

A —
B — Multiplier — C

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9

Correct Option

Solution :
9

Let,

A =		a_2	a_1	a_0
B =			b_1	b_0
A × B =		$a_2 b_0$	$a_1 b_0$	$a_0 b_0$
	$b_1 a_2$	$b_1 a_1$	$b_1 a_0$	
	$b_1 a_2$	$(a_2 b_0 + a_1 b_1)$	$(a_1 b_0 + b_1 a_0)$	$a_0 b_0$
	C_3	C_2	C_1	C_0

Number of AND gates required $X = 6$
Number of one bit full adders required $Y = 3$
$$X + Y = 6 + 3 = 9$$

QUESTION ANALYTICS