

$$1. (67AC.B)_{16} \rightarrow (\dots)_{10} \quad \text{Hex to Decimal}$$

Soln:

6	7	A	C	.	B	$\begin{cases} A = 10 \\ B = 11 \\ C = 12 \\ D = 13 \\ E = 14 \\ F = 15 \end{cases}$
6	7	10	12	.	14	

$$\begin{aligned} &= (6 \times 16^3) + (7 \times 16^2) + (10 \times 16^1) + (12 \times 16^0) + (14 \times 16^{-1}) \\ &= (6 \times 4096) + (256 \times 7) + (10 \times 16) + (12 \times 1) + (14 \times 0.6875) \\ &= 24,576 + 1792 + 160 + 12 + 0.6875 \\ &= (26540.6875)_{10} \end{aligned}$$


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$$2. (101010.101)_2 \rightarrow (\dots)_{10}$$

1	0	1	0	1	0	.	1	0	1
$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$	.	$2^{-1}$	$2^{-2}$	$2^{-3}$

$$\begin{aligned} &= (1 \times 2^5) + (0 \times 2^4) + (1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + \\ &\quad (0 \times 2^0) + (1 \times 2^{-1}) + (0 \times 2^{-2}) + (1 \times 2^{-3}) \end{aligned}$$

$$\begin{aligned} &= 32 + 0 + 8 + 0 + 2 + 0.5 + 0 + 0.125 \\ &= (42.625)_{10} \end{aligned}$$

$$3. (9762)_{14} \rightarrow (\dots)_{10}$$

9	7	6	2
$14^3$	$14^2$	$14^1$	$14^0$

$$\begin{aligned} &= (9 \times 14^3) + (7 \times 14^2) + (6 \times 14^1) + (2 \times 14^0) \\ &= (9 \times 2744) + (7 \times 196) + (6 \times 14) + (2 \times 1) \\ &= 24,696 + 1,372 + 84 + 2 \\ &= (26,154)_{10} \end{aligned}$$


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$$4. (206)_9 \rightarrow (\dots)_{10}$$

2	0	6
$9^2$	$9^1$	$9^0$

$$\begin{aligned} &= (9^2 \times 2) + (0 \times 9^1) + (6 \times 9^0) \\ &= (2 \times 81) + (0 \times 9) + (6 \times 1) \\ &= 162 + 0 + 6 \\ &= (168)_{10} \end{aligned}$$


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$$5. (1740)_8 \rightarrow (\dots)_2$$

1	1	1	1	1	1	1	1	0
001	111	100	000					

$$(1740)_8 = (001111100000)_2$$

6. 10's Complement of 5489

Soln:

9's Comp: 9 9 9 9

(-) 5 4 8 9

4 5 1 0

+

4 5 1 1

∴ 10's Complement of 5489 is 4511

7. 2's Complement of 1110101110

Soln:

1 1 1 0 1 0 1 1 1 0  
↓  
1's Com: 0 0 0 1 0 1 0 0 0 1

↓(4)

↓2

↓10

↓carry

+

0 0 0 1 0 1 0 0 1 0

∴ 2's Complement of 1110101110 is 0001010010

8. Solve the following K-map

$$F(A, B, C, D) = \sum(2, 6, 8, 13, 0, 15, 5, 10).$$

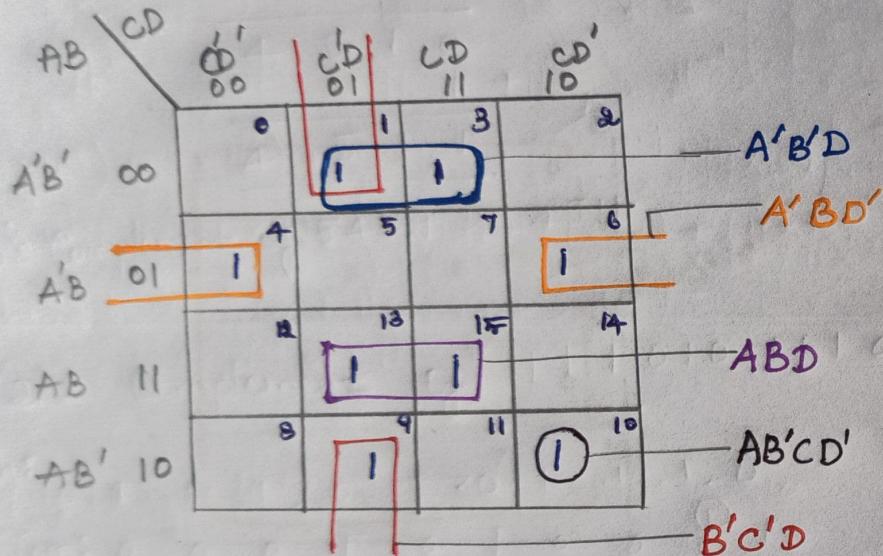
SOP

AB \ CD	C'D'	CD'	CD	CD'
A'B' 00	1	1	3	2
A'B 01	4	5	7	6
AB 11	12	13	15	14
AB' 10	8	9	11	10

$$F = ABD + BC'D + A'C'D + B'D'$$

$$9) F(A, B, C, D) = \Sigma(1, 3, 4, 6, 13, 15, 9, 10)$$

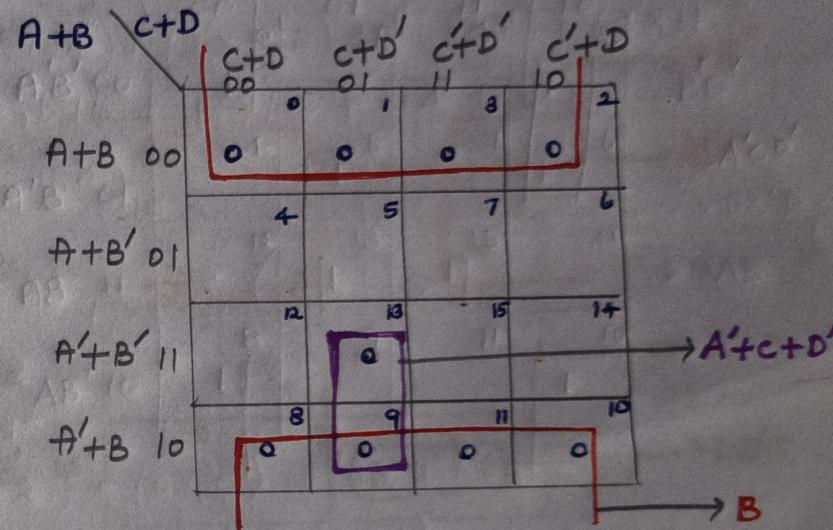
SOP:



$$F = B'C'D + ABD + A'B'D + A'BD' + AB'CD'$$

$$10) F(A, B, C, D) = \Pi(0, 2, 8, 10, 9, 11, 1, 3, 13)$$

POS:



$$F = (B)(A'+C+D')$$

$$11. F(A, B, C, D) = \overline{m}(13, 14, 15, 0, 1, 10, 11, 9, 8, 12, 2, 5, 4, 7, 6, 3)$$

POS:

	$A+B$	$C+D$	$C+D'$	$C'D'$	$C'D$
	$00$	$0$	$1$	$3$	$2$
$A+B$	$00$	$0$	$0$	$0$	$0$
$A+B'$	$01$	$4$	$5$	$7$	$6$
$A'B'$	$11$	$12$	$13$	$15$	$14$
$A'B$	$10$	$8$	$9$	$11$	$10$
		$0$	$0$	$0$	$0$

$$F = 0$$

$$12. F(A, B, C, D) = \sum(0, 1, 2, 10, 11, 13) + d(5, 6, 4)$$

SOP with don't care Inputs.

	$AB$	$CD$	$C'D'$	$C'D$	$CD$	$CD'$	$CD'$
	$00$	$00$	$0$	$1$	$3$	$2$	$1$
$A'B' 00$	$00$	$1$	$1$	$0$	$X$	$1$	$0$
$A'B' 01$	$01$	$X$	$X$	$5$	$7$	$X$	$6$
$AB' 11$	$11$	$12$	$13$	$15$	$14$	$1$	$0$
$AB' 10$	$10$	$8$	$9$	$11$	$10$	$1$	$1$

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

$$13. F(A, B, C, D) = \prod(9, 10, 11, 12, 13, 14, 15) + \\ d(8, 1, 2, 6).$$

POS with don't care inputs:

$A+B$	$C+D$	$C'D'$	$C'D$	$C'D'$
$A+B$	00	01	11	10
$A+B'$	00	X	3	X
$A+B'$	01	4	5	6
$A'+B'$	11	12	13	15
$A'+B$	10	0	0	0
$A'+B$	10	8	9	11
$A'+B$	10	X	0	0

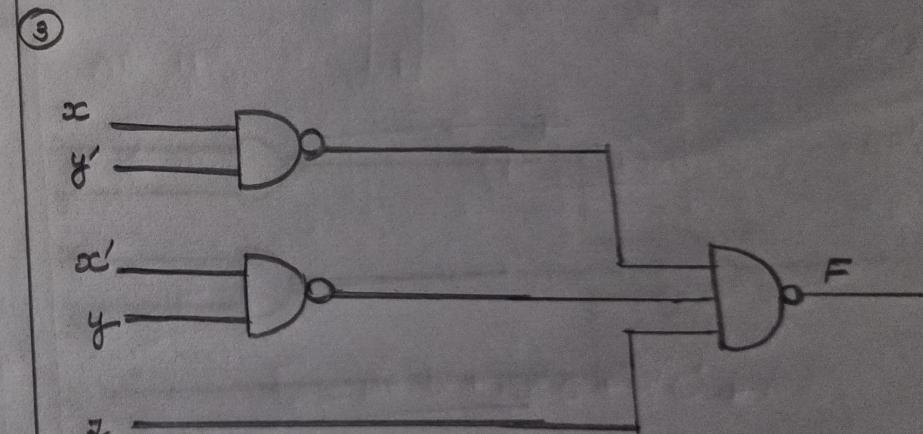
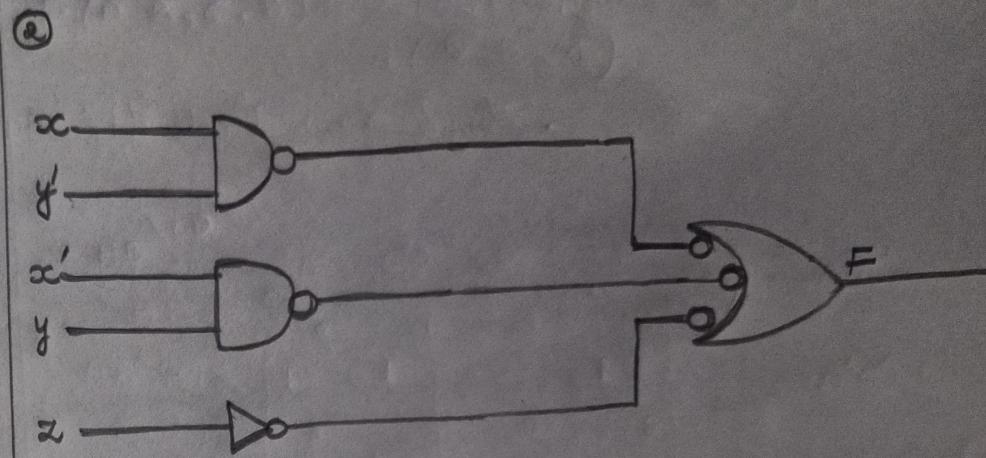
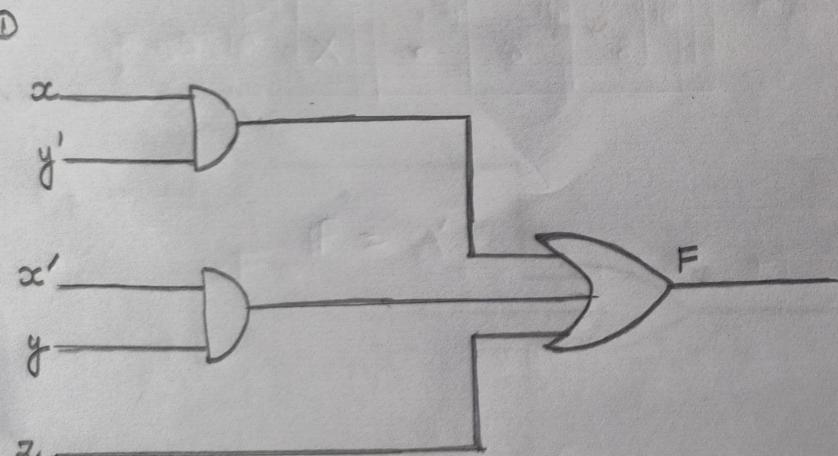
$B'$

$$F = A'$$

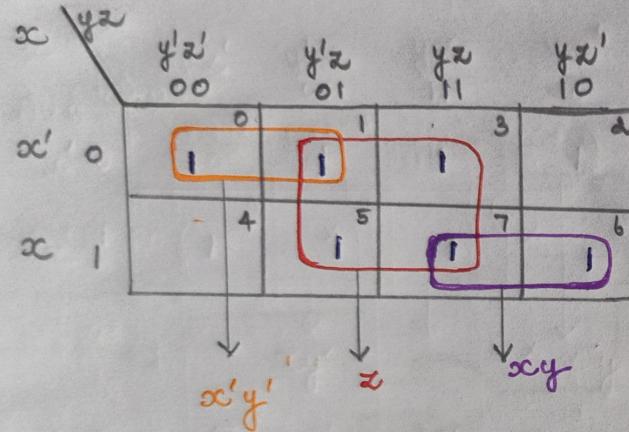
14. Implement the boolean function with NAND  
 Gate  $F(x, y, z) = \Sigma(1, 2, 3, 4, 5, 7)$ .

$x$	$y$	$z$	$x'y'$	$y'z'$	$y'z$	$yz$	$yz'$
0	0	0	1	1	0	0	0
0	0	1	1	0	1	0	0
1	0	0	0	1	1	1	1
1	0	1	0	1	0	1	1
1	1	0	0	0	0	0	1
1	1	1	0	0	0	0	0

$$F = x'y + xy' + z$$

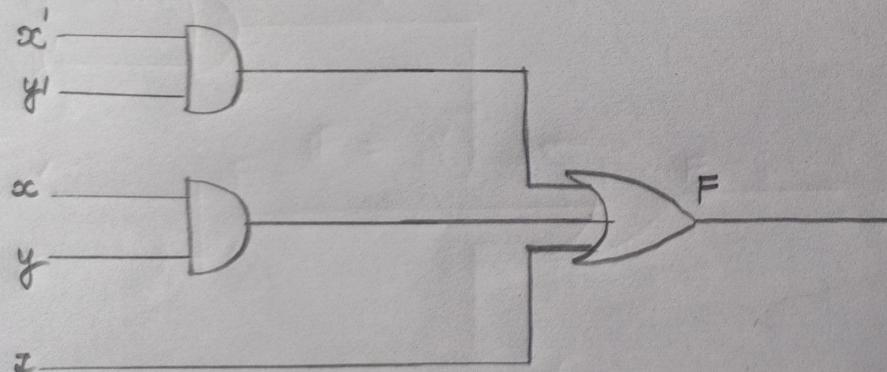


15. Implement the boolean function with NAND gate  $F(x, y, z) = \Sigma(0, 1, 3, 5, 6, 7)$ .

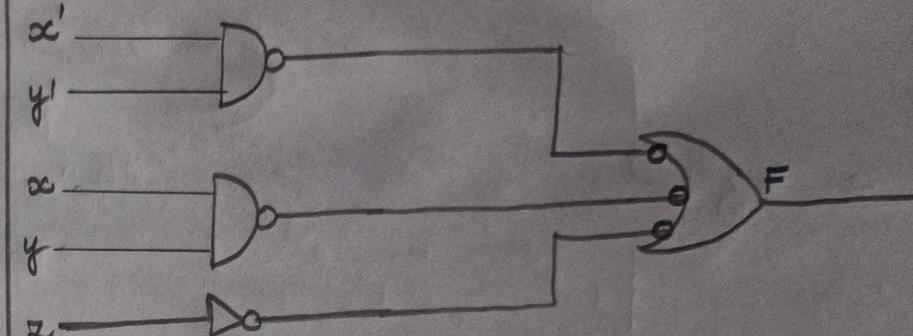


$$F = x'y' + xy + z$$

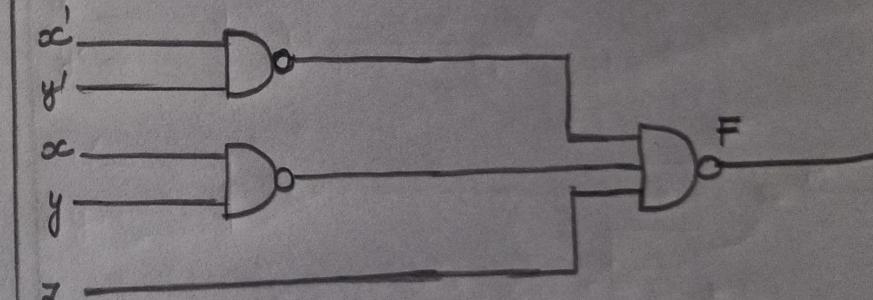
①



②



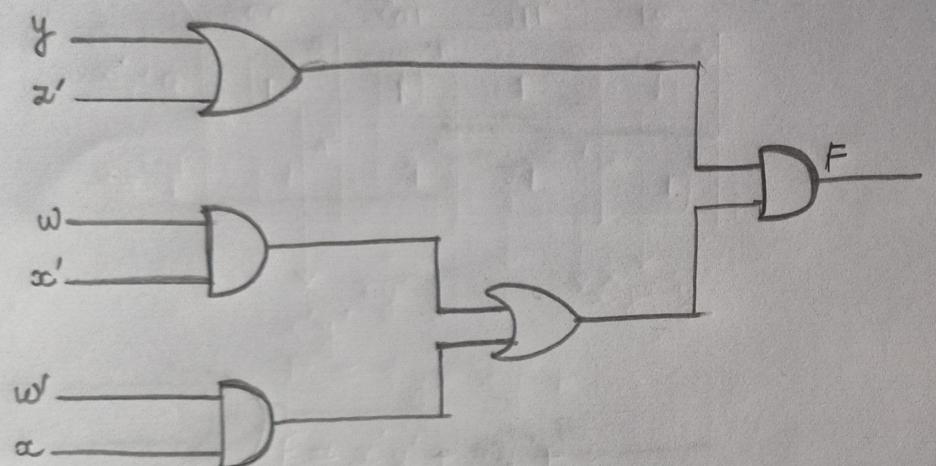
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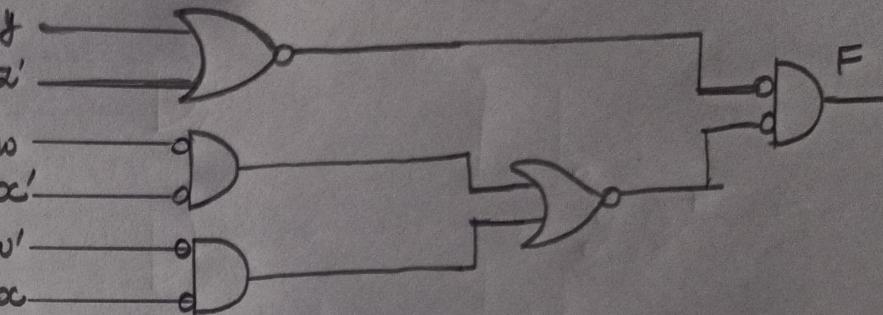
16.  $F(w, x, y, z) = (y + z') \cdot (w\bar{x}' + w'x)$  with NDR

Gate:

①

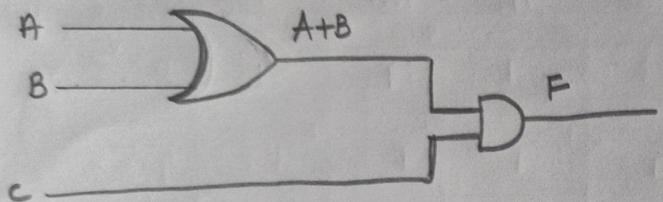


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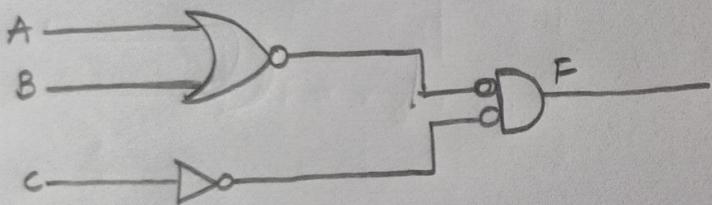


17.  $F(A, B, C) = (A+B) \cdot C$  with NOR Gate.

①



②



③

