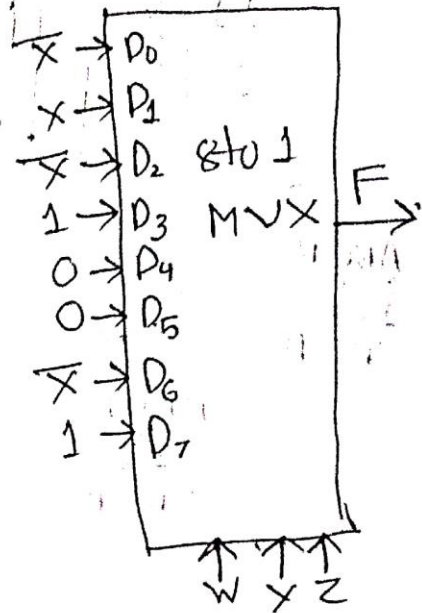


1

$$F(W, X, Y, Z) = \Sigma(0, 2, 3, 5, 7, 10, 11, 15)$$

W, X, Y, Z = selector pin

Minterms	W	X	Y	Z	F
0	0	0	0	0	1
1	0	0	0	1	1
2	0	0	1	0	0
3	0	0	1	1	1
4	0	1	0	0	1
5	0	1	0	1	0
6	0	1	1	0	0
7	0	1	1	1	0
8	1	0	0	0	1
9	1	0	0	1	1
10	1	0	1	0	0
11	1	0	1	1	0
12	1	1	0	0	0
13	1	1	0	1	0
14	1	1	1	0	0
15	1	1	1	1	1



	D ₀	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇
X̄	0	1	2	3	8	9	10	11
X	4	5	6	7	12	13	14	15
	X̄	X	X̄	1	0	0	X̄	1

2 (11)0

CFO = 1st

Head of Staff = 3rd

Employee = 2nd

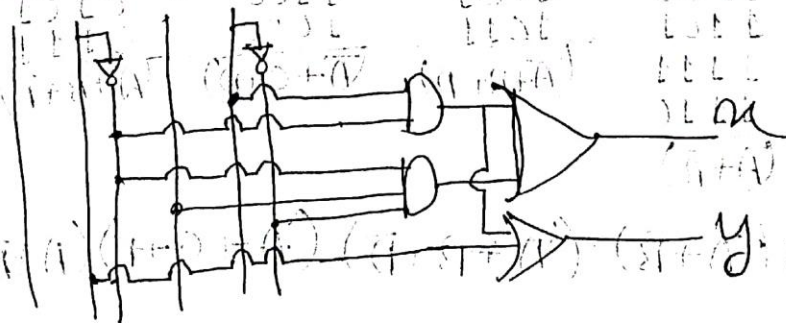
1st > 3rd > 2nd > Ground

$I_{Gnd/0}$	$I_{1st/1}$	$I_{2nd/2}$	$I_{3rd/3}$	x	y
X	1	X	X	0	1
X	0	X	1	1	1
X	0	1	0	1	0
1	0	0	0	0	0

$$x = I_3 + I_2 = I_3 \bar{I}_1 + I_2 \bar{I}_1 \bar{I}_3$$

$$y = I_1 + I_3 = I_1 + I_3 \bar{I}_1$$

I_0, I_1, I_2, I_3



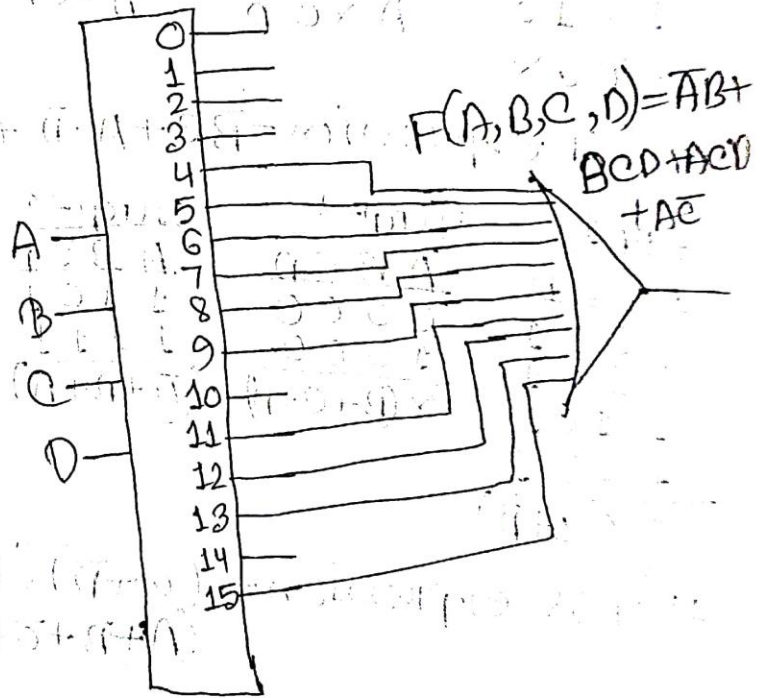
3

$$F(A, B, C, D) = \bar{A}B + BCD + ACD + A\bar{C}$$

$$= \bar{A}BCD + \bar{A}BC\bar{D} + \bar{A}B\bar{C}D + \bar{A}B\bar{C}\bar{D} + ABCD + \bar{A}BCD + A\bar{B}CD + A\bar{B}C\bar{D} + A\bar{B}\bar{C}D + A\bar{B}\bar{C}\bar{D} + AB\bar{C}D + AB\bar{C}\bar{D} + A\bar{B}CD + A\bar{B}\bar{C}D + A\bar{B}\bar{C}\bar{D}$$

$$\begin{aligned} &= \bar{A}B(C + \bar{C}) \\ &= \bar{A}BC + \bar{A}B\bar{C} \\ &= \bar{A}BCD + \bar{A}BC\bar{D} + \bar{A}B\bar{C}D + \bar{A}B\bar{C}\bar{D} \\ &= \bar{A}BCD + \bar{A}B\bar{C}D + \bar{A}B\bar{C}\bar{D} \\ &= \bar{A}BCD + \bar{A}B\bar{C}D + \bar{A}B\bar{C}\bar{D} \\ &= \bar{A}BCD + \bar{A}B\bar{C}D + \bar{A}B\bar{C}\bar{D} \\ &= \bar{A}BCD + \bar{A}B\bar{C}D + \bar{A}B\bar{C}\bar{D} \\ &= \bar{A}BCD + \bar{A}B\bar{C}D + \bar{A}B\bar{C}\bar{D} \end{aligned}$$

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



6(a)

$$F(A, B, C, D) = \Sigma(0, 2, 3, 4, 6, 10)$$

AB \ CD	00	01	11	10
00	1	0	1	1
01	1	0	0	1
11	0	0	0	0
10	0	0	0	1

Groupings: Group 1 (00, 01), Group 2 (01, 11), Group 3 (11, 10), Group 4 (00, 10), Group 5 (01, 10)

Group 1

A	B	C	D
0	0	0	0
0	1	0	0
$\overline{A} \overline{C} \overline{D}$			

Group 2

A	B	C	D
0	0	1	0
0	1	1	0
$\overline{A} \overline{C} \overline{D}$			

Group 3

A	B	C	D
0	0	1	1
0	0	1	0
$\overline{A} \overline{B} C \overline{D}$			

Group 4

A	B	C	D
0	0	1	0
1	0	1	0
$\overline{B} \overline{C} \overline{D}$			

i) $SOP = \overline{A} \overline{C} \overline{D} + \overline{A} \overline{C} \overline{D} + \overline{A} \overline{B} C \overline{D} + \overline{B} \overline{C} \overline{D}$

Group 1

A	B	C	D
0	0	0	1
0	1	0	1
1	1	0	1
1	0	0	1
$(C+D)$			

Group 2

A	B	C	D
1	1	0	0
1	1	0	1
1	1	1	1
1	1	1	0
$(A+B)$			

Group 3

A	B	C	D
1	0	0	1
1	0	1	1
$(A+B+D)$			

Group 4

A	B	C	D
1	1	0	0
1	0	0	0
$(A+C+D)$			

Group 5

A	B	C	D
0	1	0	1
0	1	1	1
$(A+B+D)$			

ii) $POS = (C+D)(A+B)(A+B+D)(A+C+D)(A+B+D)$

4

$$F(A, B, C, D) = \Sigma(2, 3, 4, 7, 10, 11, 12, 14)$$

AB \ CD	00	01	11	10
00	0	0	1	1
01	1	0	1	0
11	1	0	0	1
10	0	0	1	1

Groupings: Group 1 (0011, 0111, 1111, 1011), Group 2 (0111, 1111, 1011, 0011), Group 3 (0011, 0111, 1011, 1111), Group 4 (0011, 0111, 1111, 1011)

Group 1

A	B	C	D
0	0	1	1
0	0	1	0
1	0	1	1
1	0	1	0

$\bar{A} \bar{B} C$

Group 2

A	B	C	D
1	1	1	0
1	0	1	0

$A \bar{B} C \bar{D}$

Group 3

A	B	C	D
0	0	1	1
0	1	1	1

$\bar{A} \bar{B} C D$

Group 4

A	B	C	D
0	1	0	0
1	1	0	0

$\bar{A} B \bar{C} \bar{D}$

i) SOP expression = $\bar{B} C + A C \bar{D} + \bar{A} C D + B \bar{C} \bar{D}$

Group 1

A	B	C	D
0	0	0	1
0	1	0	1
1	1	0	1
1	0	0	1

$\bar{C} \bar{D}$

Group 2

A	B	C	D
0	0	0	0
1	0	0	0

$\bar{B} \bar{C} \bar{D}$

Group 3

A	B	C	D
1	1	0	1
1	1	1	1

$A B D$

Group 4

A	B	C	D
0	1	1	0

$\bar{A} B C \bar{D}$

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

G(b)

$$F(A, B, C, D) = \sum(0, 2, 3, 4, 6, 10)$$

$$\text{and } d(A, B, C, D) = (5, 12, 14, 15)$$

AB \ CD	00	01	11	10
00	1	0	1	1
01	1	X	0	1
11	X	0	X	X
10	0	0	0	1

Group 1: (00, 01, 11, 10) for C=1
 Group 2: (00, 01) for A=0, B=0
 Group 3: (10, 11) for A=1, B=1
 Group 4: (11, 10) for A=1, B=0

Group 1

ABCD
0010
0110
0000
0100

$$\overline{A} \times \times \overline{D}$$

Group 2

ABCD
0011
0010

$$\overline{A} \overline{B} C \times$$

Group 3

ABCD
1010

$$\overline{A} B \overline{C} \overline{D}$$

i) $SOP = \overline{A} \overline{D} + \overline{A} \overline{B} C + \overline{A} \overline{B} C \overline{D}$

Group 1

ABCD
1101
1000
1001

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

Group 2

ABCD
0001

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

Group 3

ABCD
1011

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

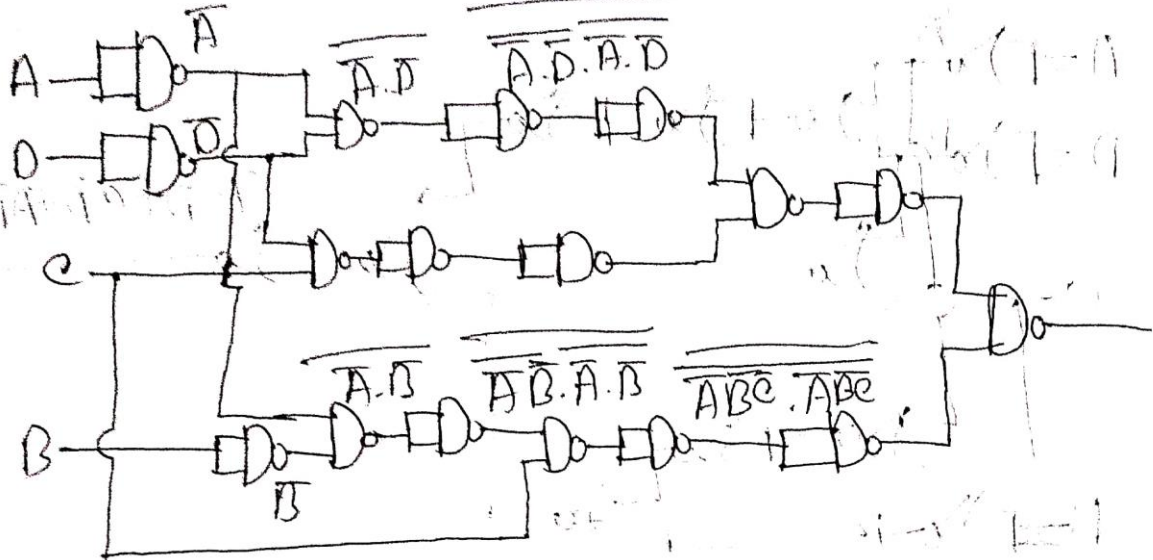
Group 4

ABCD
0111

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

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

G(c)
(ii)



G(c)
(i)

