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Ej Tenemos la sgte expresión algebraica lógica

$$M = AB + C\bar{D} + \bar{A}D + \bar{C}B$$ (Rey 1)

$(A+B+C+D)$
$(AB+B+AD)$

a) Expandir en la forma estandar de productos de suma la expresión M

b) Simplificar usando solamente algebra de Boole

c) Dibujar el circuito lógico obtenidos en item (a) y (b)

=>

AB	$C\bar{D}$	$\bar{A}D$	$B\bar{C}$
$A B \bar{C}^{\circ} \bar{D}^{\circ}$ ✓	$\bar{A} \bar{B} C \bar{D}$ ✓	$\bar{A} \bar{B} \bar{C} D$ ✓	$\bar{A} B \bar{C} \bar{D}$
$A B \bar{C}^{\circ} D^{1}$ ✓	$\bar{A} B C \bar{D}$ ✓	$\bar{A} \bar{B} C D$ ✓	$\bar{A} B \bar{C} D$ ✓
$A B C^{1} \bar{D}^{\circ}$ ✓	$A \bar{B} C \bar{D}$ ✓	$\bar{A} B \bar{C} D$ ✓	$A B \bar{C} \bar{D}$ ✓
$A B C D$ ✓	$A B C \bar{D}$ ✓	$\bar{A} B C D$ ✓	$A B \bar{C} D$ ✓

=>

$$M_{sp} = AB\bar{C}\bar{D}^{\checkmark} + AB\bar{C}D^{\checkmark} + ABC\bar{D}^{\checkmark} + ABCD^{\checkmark} + \bar{A}\bar{B}C\bar{D}^{\checkmark} + \bar{A}BC\bar{D}^{\checkmark} + A\bar{B}C\bar{D}^{\checkmark} + \bar{A}\bar{B}\bar{C}D^{\checkmark}$$
$$\bar{A}\bar{B}CD^{\checkmark} + \bar{A}B\bar{C}D^{\checkmark} + \bar{A}BCD^{\checkmark} + \bar{A}B\bar{C}\bar{D}^{\checkmark}$$

A	B	C	D	M
0	0	0	0	(0)
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	(0)
1	0	0	1	(0)
1	0	1	0	1
1	0	1	1	(0)
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

a) Ahora puedo obtener M_{ps} en su forma estándar

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

b)

$$M_{ps} = (A\bar{A}^{\circ} + \underline{AB} + \underline{AC} + \underline{AD} + \underline{B\bar{A}} + \cancel{B\bar{B}}^{B} + \underline{B\bar{C}} + \underline{B\bar{D}} + \underline{C\bar{A}} + \underline{C\bar{B}} + \cancel{C\bar{C}}^{C} + \underline{C\bar{D}}$$
$$\underline{D\bar{A}} + \underline{D\bar{B}} + \underline{D\bar{C}} + \cancel{D\bar{D}}^{D})(\cancel{\bar{A}\bar{A}}^{\bar{A}} + \bar{A}\underline{B} + \bar{A}\underline{\bar{C}} + \bar{A}\underline{\bar{D}}$$
$$+ \underline{B\bar{A}} + \cancel{B\bar{B}}^{B} + \underline{B\bar{C}} + \underline{B\bar{D}} + \underline{C\bar{A}} + \underline{C\bar{B}} + \cancel{C\bar{C}}^{\circ} + C\bar{D}$$
$$+ \underline{\bar{D}\bar{A}} + \underline{\bar{D}B} + \underline{\bar{D}\bar{C}} + \cancel{\bar{D}\bar{D}}^{\bar{D}})$$

$$M_{ps} = [B(A+\bar{A}) + C(A+\bar{A}) + D(A+\bar{A}) + B(C+C) + B(D+D) + C(D+D) + B+C+D]$$
$$[\bar{A}B + \bar{A}(\bar{C}+C) + \bar{A}\bar{D} + B(\bar{C}+C) + B\bar{D} + \bar{D}(C+\bar{C}) + \bar{A} + B + \bar{D}]$$

$$M_{PS} = [\underline{B} + \underline{C} + D + \underline{BC} + \underline{BD} + \underline{CD} + \underline{B} + C + D]$$

$$[\underline{\bar{A}B} + \underline{\bar{A}} + \underline{\bar{A}\bar{D}} + \underline{B} + \underline{B\bar{D}} + \underline{\bar{D}} + \bar{A} + B + \bar{D}]$$

$$M_{PS} = [B + BC + B + BD + C + CD + C + D]$$

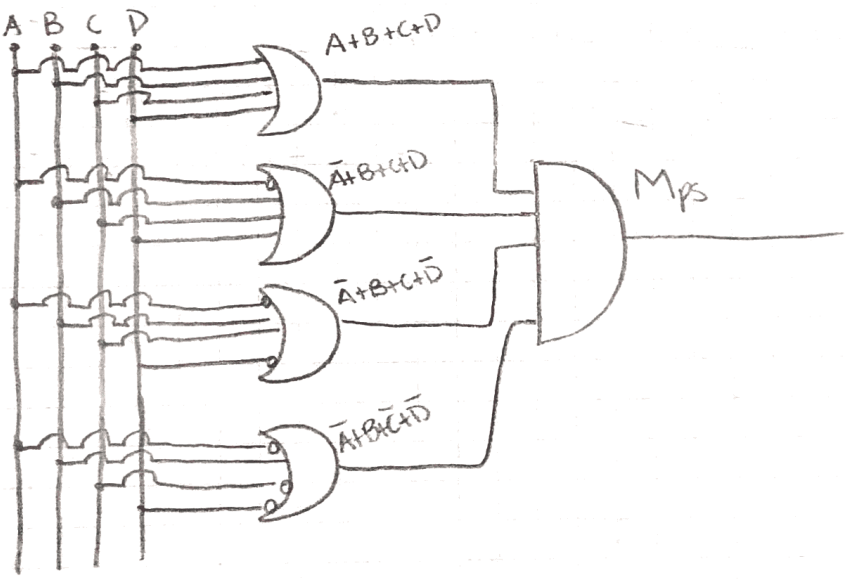
$$[\bar{A} + \bar{D} + B + \bar{A} + B + \bar{D}]$$

$$M = [B + B + C + C + D][\bar{A} + B + \bar{D}]$$

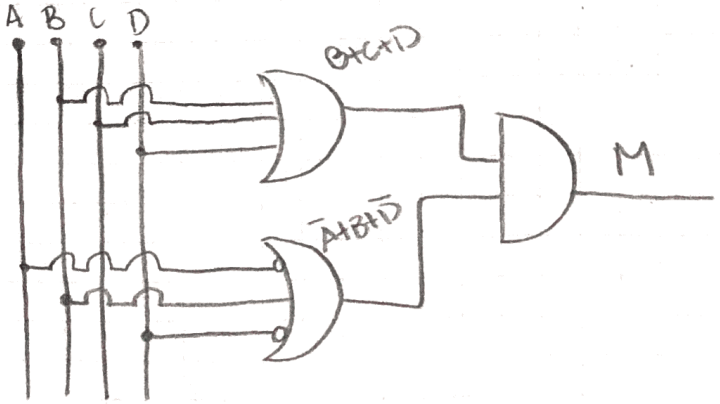
$$M = [B + C + D][\bar{A} + B + \bar{D}]$$

c)

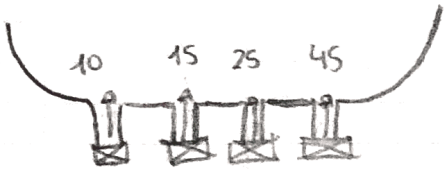
De (a)



De (b)



Ej Se tiene cuatro electroválvulas para controlar los flujos de agua en un sistema de tuberías. Los flujos a través de las electroválvulas son 10, 15, 25, 45 respectivamente (m^3/seg)



a) Obtener la tabla de la verdad para operar a la salida del sistema hidráulico 10, 40, 85, 60, 35, 70

b) Determinar la expresión lógica de salida en su forma estándar de productos de suma

c) Obtener la expresión algebraica lógica mínima usando Mk

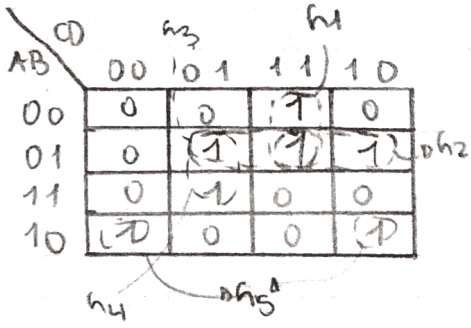
d) Dibujar la expresión algebraica lógica obtenida en el item c

a)

10	15	25	45		
A	B	C	D	X	
0	0	0	0	0	✓
0	0	0	1	0	✓
0	0	1	0	0	✓
0	0	1	1	1	✓
0	1	0	0	0	✓
0	1	0	1	1	✓
0	1	1	0	1	✓
0	1	1	1	1	✓
1	0	0	0	1	✓
1	0	0	1	0	✓
1	0	1	0	1	✓
1	0	1	1	0	✓
1	1	0	0	0	✓
1	1	0	1	1	✓
1	1	1	0	0	✓
1	1	1	1	0	

b) $X_{PS} = (A+B+C+D)\,(A+B+C+\bar{D})\,(A+B+\bar{C}+D)\,(A+\bar{B}+C+D)$
$(\bar{A}+B+C+\bar{D})\,(\bar{A}+B+\bar{C}+\bar{D})\,(\bar{A}+\bar{B}+C+D)\,(\bar{A}+\bar{B}+\bar{C}+D)$
$(\bar{A}+\bar{B}+\bar{C}+\bar{D})$

c)



$h_1 = \bar{A}\bar{B}CD + \bar{A}B\bar{C}D$
$= \bar{A}CD$

$h_2 = \bar{A}BC\bar{D} + \bar{A}BCD$
$= \bar{A}BC$

$h_3 = \bar{A}B\bar{C}D + \bar{A}BCD = \bar{A}BD$

$h_4 = \bar{A}B\bar{C}D + \bar{A}BC\bar{D} = B\bar{C}D$

$h_5 = A\bar{B}\bar{C}\bar{D} + A\bar{B}C\bar{D} = A\bar{B}\bar{D}$

$$X_{SP} = \bar{A}CD + \bar{A}BC + \bar{A}BD + B\bar{C}D + A\bar{B}\bar{D}$$

d)