**ESCOM - IPN**

Fundamentos de Diseño Digital - 2CM2

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# Minimización Algebraíca

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Reporte 2

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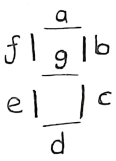
**Profesor:**
Fernando Aguilar Sanchez

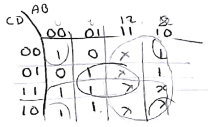
# 1. Comparador de Magnitud

## 1.1. Parte Teórica

| ABCD | a | b | c | d | e | f | g |
|---|---|---|---|---|---|---|---|
| 0000 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0001 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 0010 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| 0011 | 1 | 1 | 1 | 1 | 0 | 0 | 1 |
| 0100 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| 0101 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| 0110 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| 0111 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 1000 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1001 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| 1010 | x | x | x | x | x | x | x |
| 1011 | x | x | x | x | x | x | x |
| 1100 | x | x | x | x | x | x | x |
| 1101 | x | x | x | x | x | x | x |
| 1110 | x | x | x | x | x | x | x |
| 1111 | x | x | x | x | x | x | x |

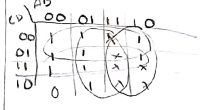



$a = \Sigma(0,2,3,5,7,8,9) + \Phi(10\text{-}15)$



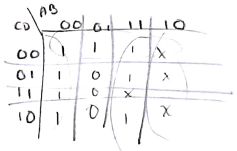
$a = \bar{B}\bar{D} + A + C + BD$

$c = \Sigma(0,1,3,4,5,6,7,8,9) + \Phi(10\text{-}15)$



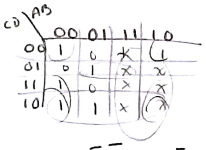
$c = A + B + D + \bar{C}$

$b = \Sigma(0,1,2,3,4,7,8,9) + \Phi(10\text{-}15)$



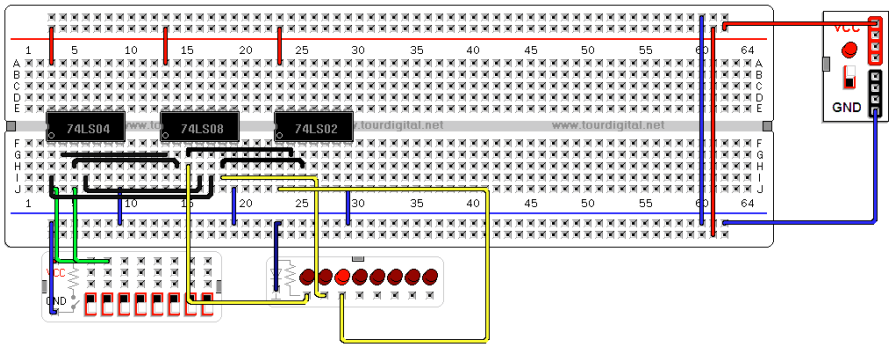
$b = A + \bar{B} + \bar{C}\bar{D}$

$d = \Sigma(0,2,3,5,6,8) + \Phi(10\text{-}15)$



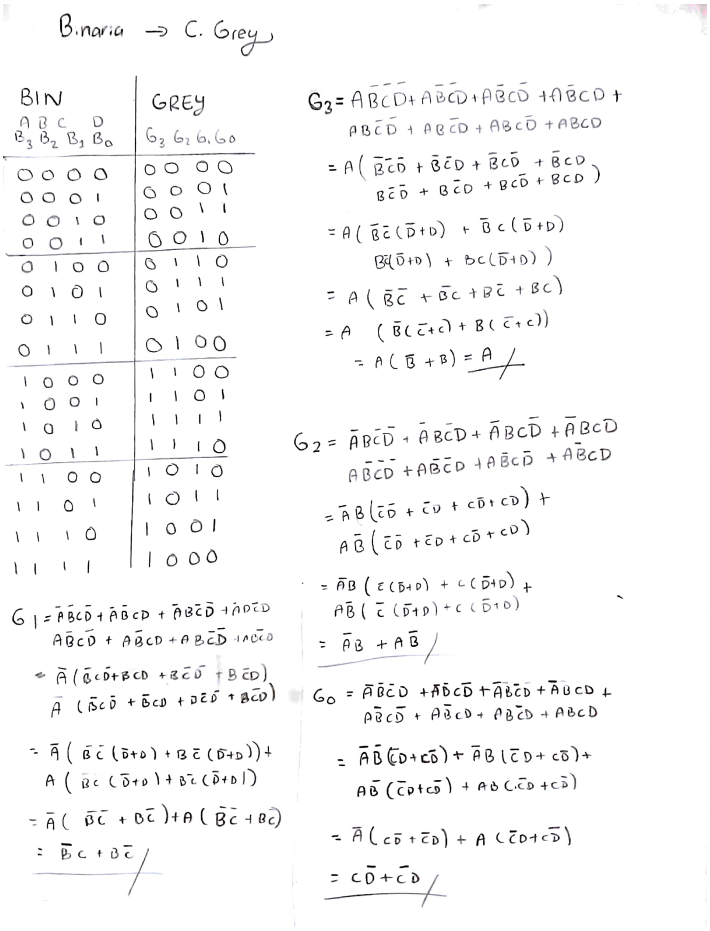
$d = A + \bar{B}\bar{D} + B\bar{C}D + \bar{B}C + C\bar{D}$

## 1.2. Parte Practica



# 2. De Código Binario a Código Grey

## 2.1. Parte Teórica



Binaria → C. Grey

| BIN $B_3\ B_2\ B_1\ B_0$ | GREY $G_3\ G_2\ G_1\ G_0$ |
|---|---|
| 0 0 0 0 | 0 0 0 0 |
| 0 0 0 1 | 0 0 0 1 |
| 0 0 1 0 | 0 0 1 1 |
| 0 0 1 1 | 0 0 1 0 |
| 0 1 0 0 | 0 1 1 0 |
| 0 1 0 1 | 0 1 1 1 |
| 0 1 1 0 | 0 1 0 1 |
| 0 1 1 1 | 0 1 0 0 |
| 1 0 0 0 | 1 1 0 0 |
| 1 0 0 1 | 1 1 0 1 |
| 1 0 1 0 | 1 1 1 1 |
| 1 0 1 1 | 1 1 1 0 |
| 1 1 0 0 | 1 0 1 0 |
| 1 1 0 1 | 1 0 1 1 |
| 1 1 1 0 | 1 0 0 1 |
| 1 1 1 1 | 1 0 0 0 |

$G_3 = A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D + A\bar{B}C\bar{D} + A\bar{B}CD + AB\bar{C}\bar{D} + AB\bar{C}D + ABC\bar{D} + ABCD$

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

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

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

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

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

$G_2 = \bar{A}B\bar{C}\bar{D} + \bar{A}B\bar{C}D + \bar{A}BC\bar{D} + \bar{A}BCD + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D + A\bar{B}C\bar{D} + A\bar{B}CD$

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

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

$= \bar{A}B + A\bar{B}$

$G_1 = \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}CD + \bar{A}B\bar{C}\bar{D} + \bar{A}BC\bar{D} + A\bar{B}\bar{C}D + A\bar{B}CD + AB\bar{C}\bar{D} + ABC\bar{D}$

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

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

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

$= \bar{B}C + B\bar{C}$

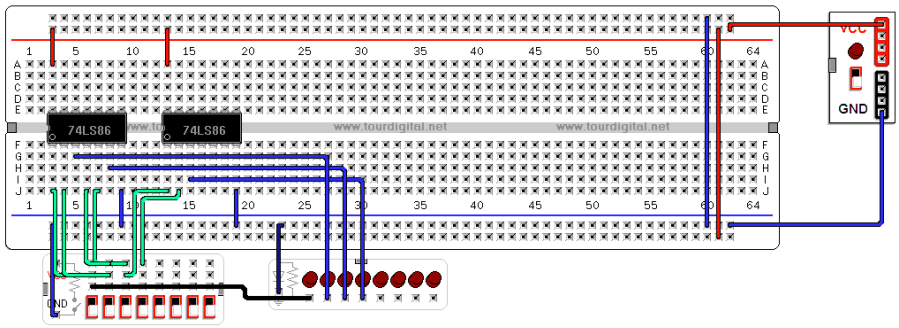
$G_0 = \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}C\bar{D} + \bar{A}B\bar{C}D + \bar{A}BC\bar{D} + A\bar{B}\bar{C}D + A\bar{B}C\bar{D} + AB\bar{C}D + ABC\bar{D}$

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

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

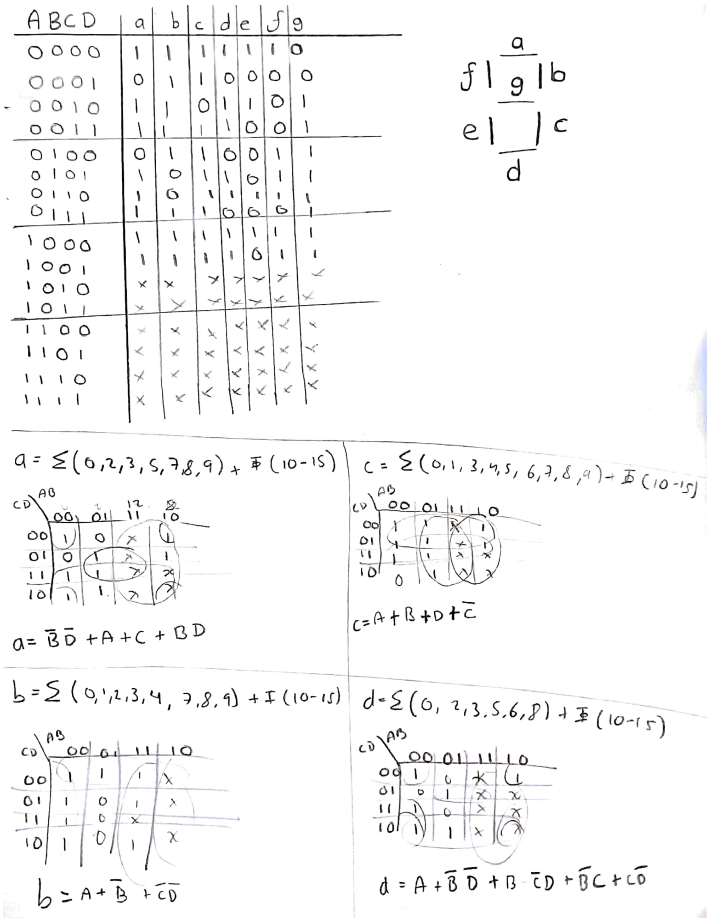
$= C\bar{D} + \bar{C}D$

## 2.2. Parte Practica



# 3. De Código BCD a 7 Segmentos

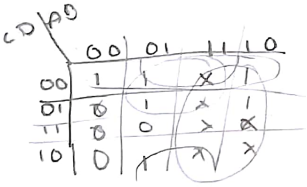
## 3.1. Parte Teórica



$e = \Sigma(0,2,6,8) + \Phi(10\text{-}15)$

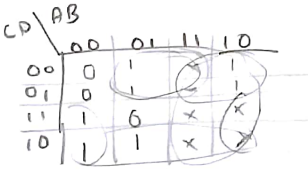

$e = \bar{B}\bar{D} + C\bar{D}$

$f = \Sigma(0,4,5,6,8,9) + \Phi(10\text{-}15)$




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

$g = (2,3,4,5,6,8,9) + \Phi((10\text{-}15)$




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

## 3.2. Parte Practica