Digital Logic Design :

Lecture 9

Decimal to Binary Conversion :

$(13)_{10} = (??)_2$

Repeated division by 2 method

	quotient	remainder	
$\frac{13}{2}$	$= 6$	1	LSB
$\frac{6}{2}$	$= 3$	0	
$\frac{3}{2}$	$= 1$	1	
$\frac{1}{2}$	$= 0$	1	MSB

$\therefore (13)_{10} = (1101)_2$

$(158)_{10} = (??)_2 = (??)_6$

	quotient	remainder	
$\frac{158}{2}$	$= 79$	0	LSB
$\frac{79}{2}$	$= 39$	1	
$\frac{39}{2}$	$= 19$	1	
$\frac{19}{2}$	$= 9$	1	
$\frac{9}{2}$	$= 4$	1	
$\frac{4}{2}$	$= 2$	0	↑
$\frac{2}{2}$	$= 1$	0	
		1	MSB

$\therefore (158)_{10} = (10011110)_2$

$(0.375)_{10} = (??)_2$

$0.375 \times 2 = 0.75$ 0

$0.75 \times 2 = 1.50$ 1 ↓

$0.50 \times 2 = 1.00$ 1

$\therefore (0.375)_{10} = (0.011)_2$

$(0.59375)_{10} = (??)_2 = (??)_4$

$0.59375 \times 2 = 1.1875$ 1

$0.1875 \times 2 = 0.375$ 0

$0.375 \times 2 = 0.75$ 0 ↓

$0.75 \times 2 = 1.50$ 1

$0.50 \times 2 = 1.00$ 1

$\therefore (0.59375)_{10} = (0.10011)_2$

Decimal to Octal conversion :

P.T.O.

Decimal to Octal conversion:

$(335)_{10} = (??)_8$

$\frac{335}{8} = 41 \cdot 875$ $\quad 0 \cdot 875 \times 8 = 7$ LSB

$\frac{41}{8} = 5 \cdot 125$ $\quad 0 \cdot 125 \times 8 = 1$ ↑

$\frac{5}{8} = 0 \cdot 625$ $\quad 0 \cdot 625 \times 8 = 5$ MSB

$\therefore (335)_{10} = (517)_8$

$(0 \cdot 8125)_{10} = (??)_8$

$0 \cdot 8125 \times 8 = 6 \cdot 5$ $\quad$ 6 MSB

$0 \cdot 5 \times 8 = 4$ $\quad$ 4 LSB ↓

$\therefore (0 \cdot 8125)_{10} = (0 \cdot 64)_8$

Binary to Octal conversion:

$\overbrace{1101}\ \overbrace{110} \cdot \overbrace{110}\ \overbrace{111}\ \overbrace{01}$

$= (156 \cdot 672)_8$

Decimal to Hexadecimal conversion:

$(2591)_{10} = (??)_{16}$

$\frac{2591}{16} = 161 \cdot 9375$ $\quad 0 \cdot 9375 \times 16 = 15 = F$ LSB

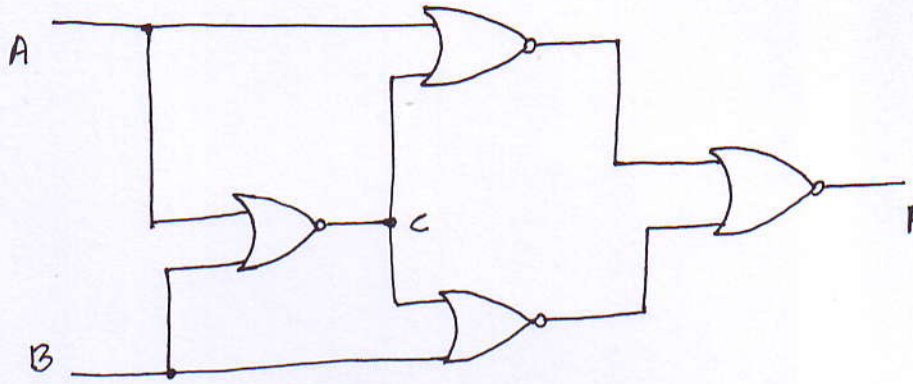
$\frac{161}{16} = 10 \cdot 0625$ $\quad 0 \cdot 0625 \times 16 = 1$

Binary to Hexadecimal conversion:

$1\overbrace{1010}\overbrace{0101}\overbrace{1110} \cdot \overbrace{0111}\overbrace{0100}11$

$= (1A5E \cdot 74C)_{16}$

Determine the logic operation done by the following circuit:



$F = \overline{\bar{A}B + A\bar{B}} = \overline{\bar{A}B}\;\overline{A\bar{B}}$

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

$C = \overline{A+B} = \bar{A}\,\bar{B}$

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

$= C + AB$

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

$= A \odot B$

Truth table

Syllabus covered:

1) Number conversions (Octal, Hexadecimal, Binary, Decimal)
2) BCD addition
3) Standard SOP/POS expression
4) Signed Number
5) Logic simplification using Boolean Algebra
6) Logic simplification using K map
7) Timing diagram
8) Excess-3 code, Gray code