Logic Design – Tutorial 01

#	Student ID	Student Name	Grade (10)
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Q1	Is the first remainder obtained in the division method for base conversion the most or least significant digit?
Sol 1	

Q2	An easy method for conversion between binary and hexadecimal is illustrated In Why should you start forming the groups of four bits at the binary point instead of the left end of the number?
Sol 2	

Q3	Why is it impossible to convert a decimal number to binary on a digit-by digit basis as can be done for hexadecimal?
Sol 3	

Q4	Complete the following conversion table.
Sol 4	

Binary (base 2)	Octal (base 8)	Decimal (base 10)	Hexadecimal (base 16)
0	0	0	0
1			
10			
11			
100			
101			
110			
111			
1000			
1001			
1010			
1011			
1100			
1101			
1110			
1111			
10000	20	16	10

Q5	Convert to hexadecimal and then to binary (a) 757.25_{10} (b) 123.17_{10}
Sol 5	757.25_{10} 16 | 757 — 0.25 16 | 47 r5 — 16 16 | 2 r15=F_{16} — (4).00 0 r2 $\therefore 757.25_{10} = 2F5.40_{16}$ $= \underline{0010}\ \underline{1111}\ \underline{0101}.\underline{0100}\ \underline{0000}_2$ 2 F 5 4 0 - - - - - 123.17_{10} 16 | 123 — 0.17 16 | 7 r11 — 16 0 r7 — (2).72 16 (11).52 16 (8).32 $\therefore 123.17_{10} = 7B.2B_{16}$ $= \underline{0111}\ \underline{1011}.\underline{0010}\ \underline{1011}_2$ 7 B 2 B

Q6	Convert to octal. Convert to hexadecimal. Then convert both of your answers to decimal, and verify that they are the same 11010110001.011_2

Sol 6

$$EB1.6_{16} = E \times 16^2 + B \times 16^1 + 1 \times 16^0 + 6 \times 16^{-1}$$
$$= 14 \times 256 + 11 \times 16 + 1 + 6/16 = 3761.375_{10}$$
$$\underline{1110}\ \underline{1011}\ \underline{0001}.\underline{011(0)}_2$$
$$E \quad B \quad 1 \quad 6$$

$$7261.3_8 = 7 \times 8^3 + 2 \times 8^2 + 6 \times 8^1 + 1 + 3 \times 8^{-1}$$
$$= 7 \times 512 + 2 \times 64 + 6 \times 8 + 1 + 3/8 = 3761.375_{10}$$
$$\underline{111}\ \underline{010}\ \underline{110}\ \underline{001}.\underline{011}_8$$
$$7 \quad 2 \quad 6 \quad 1 \quad 3$$

Q7

(a) Convert to hexadecimal: 1457.1110. Round to two digits past the hexadecimal point.
(b) Convert your answer to binary, and then to octal.
(c) convert your answer to base 4.

Sol 7

1457.11_{10}

16 | 1457		0.11
16 | 91	r1	16
16 | 5	r11=B_{16}	(1).76
0	r5	16
		(12).16

$\therefore\ 1457.11_{10} = 5B1.1C_{16}$

$$5B1.1C_{16} = \overbrace{0101}^{5}\overbrace{1011}^{B}\overbrace{0001}^{1}.\overbrace{0001}^{1}\overbrace{1100}^{C}{}_2 = 2661.070_8$$
$$2 \quad 6 \quad 6 \quad 1 \quad 0 \quad 7 \quad 0$$

$$5B1.1C_{16} = \underline{11}\ \underline{23}\ \underline{01}.\underline{01}\ \underline{30}_4$$
$$5 \quad B \quad 1 \quad 1 \quad C$$