INSTITUTE OF
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OF CANADA

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Introduction to Computers

Institute of Technology Development of Canada

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Conversion table

- Decimal – based-10
  0,1,2,3,4,5,6,7,8,9
- Hexadecimal – based-16
- Octal – based-8
- Quaternary – based-4
- Binary – based-2

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HEXADECIMAL TO DECIMAL

- HEXADECIMAL – BASED-16

0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F

Ex: $(A1F6)_{16}$

Hex number	A	1	F	6
Successive powers of 16	16^3	16^2	16^1	16^0
calculation	10 x 4096	1 x 256	15 x 16	6 x 1
decimal	40960	256	240	6

$$(A1F6)_{16} = (41,462)_{10}$$

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HEXADECIMAL TO BINARY

Ex: $(A1F6)_{16}$

Which numbers you can Sum to get A(10)?

Which numbers you can Sum to get 6?

Hex.	A				1				F				6			
Successive powers of 2	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
Binary	1	0	1	0	0	0	0	1	1	1	1	1	0	1	1	0

$$(A1F6)_{16} = (1010000111110110)_2$$

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DECIMAL TO HEXADECIMAL

- Binary Number : $(41,462)_{10}$

16	41,462	remainder -> 6
16	2591	remainder -> 15
16	161	remainder -> 1
16	10	remainder -> 10

$(10)1(15)6 = (A1F6)_{16}$

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OCTAL TO DECIMAL

- OCTAL – BASED-8

0,1,2,3,4,5,6,7

Ex: $(507)_8$

Octal number	5	0	7
Successive powers of 8	8^2	8^1	8^0
calculation	5 x 64	0 x 8	7 x 1
decimal	320	0	7

$$(507)_8 = (327)_{10}$$

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OCTAL TO BINARY

Ex: $(507)_8$

Hex.	5			0			7		
Successive powers of 2	4	2	1	4	2	1	4	2	1
Binary	1	0	1	0	0	0	1	1	1

$$(507)_8 = (101000111)_2$$

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DECIMAL TO OCTAL

- Decimal Number : $(327)_{10}$

8	327	remainder -> 7
8	40	remainder -> 0
8	5	remainder -> 5

$(507)_8$

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CONVERTING BINARY TO DECIMAL

- Binary Number : $(10101)_2$

Binary number	1	0	1	0	1
Successive powers of 2	2^4	2^3	2^2	2^1	2^0
calculation	1 x 16	0 x 8	1 x 4	0 x 2	1 x 1
decimal	16	0	4	0	1

$$(10101)_2 = 16 + 0 + 4 + 0 + 1$$

$$(10101)_2 = (21)_{10}$$

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CONVERTING REAL NUMBERS

- $(0.1011)_2$

Decimal Number
Successive powers of 2
calculation
decimal

.	1	0	1	1
	2^{-1}	2^{-2}	2^{-3}	2^{-4}
	1 x 0.5	0 x 0.25	1 x 0.125	1 x 0.0625
	0.5	0	0.125	0.0625

$$(0.1011)_2 = (0.6875)_{10}$$

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CONVERTING REAL NUMBERS

- $(0.6875)_{10}$

2	0.6875	decimal point-> 1
2	0.375	decimal point-> 0
2	0.75	decimal point-> 1
2	0.5	decimal point -> 1

$(0.1011)_2$

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CONVERTING REAL NUMBERS

- $(0.3)_{10}$

0.3	x 2	0.6	decimal point-> 0
0.6	x 2	1.2	decimal point-> 1
0.2	x 2	0.4	decimal point-> 0
0.4	x 2	0.8	decimal point -> 0
0.8	x 2	1.6	decimal point -> 1
0.6	x 2	1.2	de cimal point -> 1
0.2	x 2	0.4	decimal point -> 0
0.4	x 2	0.8	decimal point -> 0
0.8	x 2	1.6	decimal point -> 1
0.6	x 2	1.2	decimal point -> 1
…			

$(0.0100110011)_2$

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Thank You!