

Paper 7, TDC Part-3
Chapter– 3, Number Systems and Codes
Electronics
Hexadecimal Number System-2

By:

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Number Systems and Codes

Hexadecimal-to₁₆-Binary conversion

For conversion of hexadecimal number to its equivalent binary number, replace each hexadecimal symbol by 4-bit binary number.

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Example: Convert following hexadecimal number to its equivalent binary number.

- (a) F01A (b) ~~E~~.FF2
(c) 71.0E

Sol: (a) $(F01A)_{16} = (?)_2$

$$(F01A)_{16} = \left(\overbrace{1111}^F \overbrace{0000}^0 \overbrace{0001}^1 \overbrace{1010}^A \right)_2$$

$$(F01A)_{16} = (1111000000011010)_2$$

(b) $(0.FF2)_{16} = (0.11111110010)_2$

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$$(c) (71.0E)_{16} = (01110001.00001110)_2$$

Binary - to - Hexadecimal Number conversion

To convert any binary number to its equivalent hexadecimal number is done by converting group of 4-bit binary number to its equivalent hexadecimal number.

Process for grouping :->

(a) For integer part.

→ Start ^{grouping of bits} from Right to left i.e. (LSB to MSB)

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(a) For integer part.

→ Start ^{grouping of bits} from Right to left i.e. (LSB to MSB)

→ In case at last ~~bits~~ there is less than 4-bit then add as much zero as required to form group.

(b) For fractional part.

→ Start making groups of 4-bits from ~~radix~~ ^{bits} after radix point i.e. move towards left to right for fractional part.

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→ If at last there are not 4-bits for group then add as much zero's as required to form group of 4 bits.

Example Convert following binary numbers to its equivalent hexadecimal numbers.

(a) 110100100

(b) 11011011101

(c) 0.110011

(d) 0.10101

(e) 111.01

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(e) 111.01

Solution $(\overbrace{110100}^1 \overbrace{100}^4)_2 = (\overbrace{00011010}^1 \overbrace{0100}^4)_2$

Only one bit left so add 3 zeros

$$= (1A4)_{16}$$

$$(ii) (\overbrace{110110}^6 \overbrace{1101}^D)_2 = (\overbrace{0110}^6 \overbrace{1101}^D \overbrace{1101}^D)_2$$

$$= (6DD)_{16}$$

$$(iii) (0.\overbrace{110011})_2 = (0.\overbrace{1100}^1 \overbrace{1000}^2)_2$$

Only one bit left so add 2 zeros to form group.

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$$(iv) (0.\overline{10101})_2 = (0.\overline{10101000})_2 \\ = (0.A8)_{16}$$

* Conversion from Hexadecimal to Octal number.

Conversion of Hexadecimal to Octal number can be done by converting hexadecimal to binary or decimal number, then ~~convert~~ again converting this binary or decimal number to octal ~~number~~ number. Using

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Conversion of Hexadecimal to Octal number can be done by converting hexadecimal to binary or decimal number, then again converting this binary or decimal number to octal number. Using conversion with help of binary number will be simple.

Example: Convert following hexadecimal number to its equivalent octal number.

(a) (F01) (b) 0.1A2 (c) 98.1C

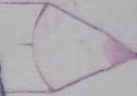
Sol: (a) $(F01)_{16} = (?)_8$

$(F01)_{16} = (\overline{1111} \overline{0000} \overline{0001})_2$

$(F01)_{16} = (7401)_8$

Direction of grouping

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Dissection of groups 

(b) $(0.1A2)_{16} = (0.\overline{0001}\overline{1010}\overline{0010})_2$

$(0.1A2)_{16} = (0.0642)_8$

(c) $(98.1C)_{16} = (\overline{1001}\overline{1000}.\overline{0001}\overline{1100})_2$

Add one zero to make group of 3s

$(98.1C)_{16} = (\overline{010}\overline{011}\overline{000}.\overline{000}\overline{111}\overline{000})_2$

$= (230.070)_8$

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Conversion from Octal to Hexadecimal Number system.

The conversion of Octal number into its equivalent hexadecimal number can be done by first converting octal number to binary or decimal number, then converting binary or decimal number to its equivalent hexadecimal number.

Using
→ Binary conversion technique is simple.

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Example: Convert following Octal numbers to its equivalent binary numbers.

(a) $(671)_8$ (b) $(0.7140)_8$

(c) $(5231)_8$

Soln: (a) $(671)_8 = (\underline{110} \underline{111} \underline{001})_2$

Add 3 zeros to make group.

$(\underline{0001} \underline{1011} \underline{1001})_2 = (1B9)_{16}$

(b) $(0.7140)_8 = (0.\underline{111} \underline{001} \underline{100} \underline{000})_2$

$= (0.E60)_{16}$

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Thank You