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DIGITAL SYSTEM DESIGN - 20XC14

WORKSHEET I

NUMBER SYSTEM REPRESENTATION

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D21PC35

① a) $2^{11} - 1 = 2047$

b) $2^{25} - 1 = 33554431$

② a) $(10110.0101)_2$

$= (1 \times 2^4) + (0 \times 2^3) + (1 \times 2^2) + (1 \times 2) + (0 \times 2^0) + (0 \times 2^{-1})$

$+ (1 \times 2^{-2}) + (0 \times 2^{-3}) + (1 \times 2^{-4}) = (22.3125)_{10}$

b) $(16.5)_{16} = (1 \times 16^1) + (6 \times 16^0) + (5 \times 16^{-1})$

$= 16 + 6 + \frac{5}{16} = (22.3125)_{10}$

c) $(26.24)_8 = (2 \times 8^1) + (6 \times 8^0) + (2 \times 8^{-1}) + 4 \times 8^{-2}$

$= 16 + 6 + 0.25 + 0.0625$

$= (22.3125)_{10}$

d) $(DADA.B)_{16} = (13 \times 16^3) + (10 \times 16^2) + (13 \times 16^1) + (10 \times 16^0) + (11 \times 16^{-1})$

$= (56026.6875)_{10}$

e) $(1010.1101)_2 = (1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (0 \times 2^0) + (1 \times 2^{-1}) + (1 \times 2^{-2})$

$+ (0 \times 2^{-3}) + (1 \times 2^{-4})$

$= 8 + 2 + 0.5 + 0.25 + 0.0625$

$= (10.8125)$

③

DECIMAL	BINARY	OCTAL	HEXADECIMAL
369.3125	101110001.0101	561.24	171.5
189.625	10111101.101	275.5	BD.A
214.625	11010110.101	326.5	D6.A
62407.625	1111001111000111.101	171707.5	F3C7.A

④ a) $(673.6)_8$

$= (110\,111\,011.110)_2$

$(1BB.C)_{16}$

b) $(E7C.B)_{16}$

$= (1110\,0111\,1100.1011)_2$

$= (7174.54)_8$

c) $(310.2)_{16}$

$= (11\,0001\,0000.001)_2$

$= (1420.1)_8$

⑤ a) The digits will be :

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

b) $(2007)_{10} = (7)_{20}$

c) $(BCI.G)_{20}$

$= (11 \times 20^2) + (12 \times 20^1) + (18 \times 20^0) + (16 \times 20^{-1})$

$= (4658.05)_{10}$

⑥ a) $n = 16$

b) $n = 8$

⑦ a) $(27.315)_{10} = (2 \times 2^1) + (7 \times 2^0) + (3 \times 2^{-1}) + (1 \times 2^{-2}) + (5 \times 2^{-3})$

$= 4 + 7 + 1.5 + 0.25 + 0.625$

$= 13.375$

b)

⑧ a) $(4310)_5 = (4 \times 5^3) + (3 \times 5^2) + (1 \times 5^1)$

$= 500 + 75 + 5$

$= (580)_{10}$

b) $(198)_{12} = (1 \times 12^2) + (9 \times 12^1) + (8 \times 12^0)$

$= 144 + 108 + 8$

$= (260)_{10}$

c) $(435)_8 = (4 \times 8^2) + (3 \times 8^1) + (5 \times 8^0)$

$= 256 + 24 + 5$

$= (285)_{10}$

d) $(345)_6 = (3 \times 6^2) + (4 \times 6^1) + (5 \times 6^0)$

$= 108 + 24 + 5$

$= (137)_{10}$

⑨ a) 32K = 32768 bytes

b) 64M = 67108864 bytes

c) 6.4 G = 6871947674 bytes

⑩ 6.