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BSSE

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Q1)

a) $(1011100.10101)_2 = (\ldots)_{10}$

$= 1\times2^6 + 0\times2^5 + 1\times2^4 + 1\times2^3 + 1\times2^2 + 0\times2^1$
$+ 0\times2^0 + 1\times2^{-1} + 0\times2^{-2} + 1\times2^{-3} + 0\times2^{-4}$
$+ 1\times2^{-5}$

$= 64 + 0 + 16 + 8 + 4 + 0 + 0 + 0.5$
$+ 0 + 0.125 + 0 + 0.03125$

$= 92.65625$

$(1011100.10101)_2 = (92.65625)_{10}$

b) $(111100.101) = (\ldots)_{10}$

$= 1\times2^5 + 1\times2^4 + 1\times2^3 + 1\times2^2 + 0\times2^1 +$
$0\times2^0 + 1\times2^{-1} + 0\times2^{-2} + 1\times2^{-3}$

$= 32 + 16 + 8 + 4 + 0 + 0 + 0.5 + 0.125$

$= 60 + 0.5 + 0.125$

$= 60.625$

Scanned by CamScanner

c) $(ABCD)_{16} = (\ldots)_2$

From the conversion table

$(ABCD)_{16} = (1010\ \ 1011\ \ 1100\ \ 1101)_2$

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

D) $(10)_{10} = (?)_K$

As we know in hexadecimal number after 9 is A which is equivalent to decimal

$10 \Rightarrow (10)_{10} = \cancel{A}((A)_{16}$

E. $(7777)_8 = (?)_{10}$

$(7777)_8 = 7\times8^3 + 7\times8^2 + 7\times8^1 + 7\times8^0$

$= 3584 + 448 + 56 + 7$

$= (4095)_{10}$

F. $(7777)_8 = (?)_2$

As $(7777)_8 = (4095)_{10}$

so converting $(4095)_{10}$ into binary)

2	4095	
2	2047	- 1
2	1023	- 1
2	511	- 1
2	255	- 1
2	127	- 1
2	63	- 1
2	31	- 1
2	15	- 1
2	7	- 1
2	3	- 1
	1	- 1

$(7777)_8 = (4095)_{10} = (111111111111)_2$

G. $(7777) = (?)_{16}$

As $(7777) = (4095) = (?)_{16}$

16	4095
16	255 — 15 = F
	15 15 = F
	F

~~So (77~~

So $(7777)_8 = (FFF)_{16}$

H. $(10101111)_2 = (?)_8$

Grouping in 3 bits starting from RHS & using conversion table

$\underbrace{10}_{2}\ \underbrace{101}_{5}\ \underbrace{111}_{7}$

$(10101111)_2 = (257)_8$

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

I. $(101010)_{10} = (?)_8$

8	101010
8	12626 — 2
8	1578 — 2
8	197 — 2
8	24 — 5
	3 — 0

$(101010)_{10} = (305222)_8$

J. $(98)_{10} = (?)_{BCD}$

Using conversion

$(98)_{10} = (10011000)_{BCD}$

BCD conversion table

0	0	0	0	– 0
0	0	0	1	– 1
0	0	1	0	– 2
0	0	1	1	– 3
0	1	0	0	– 4
0	1	0	1	– 5
0	1	1	0	– 6
0	1	1	1	– 7
1	1	0	0	– 8
1	1	0	1	– 9

Q2)

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

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

$= \overline{A} + B + \overline{C} \cdot \overline{\overline{D}}$

$= \overline{A} + B + \overline{C} \cdot D$

B. $\overline{(A+\overline{B}+C+\overline{D})} + \overline{ABC\overline{D}}$

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

$= \overline{A} \cdot B \cdot \overline{C} \cdot D + \overline{A} + \overline{B} + \overline{C} + D$

Q3)

A) $\bar{x}\bar{y}\bar{z} + \bar{x}y\bar{z} + x\bar{y}z + \bar{x}yz + xy\bar{z}$ $\quad 2^3 = 8$

x	y	z	$\bar{x}\bar{y}\bar{z}$	$\bar{x}y\bar{z}$	$x\bar{y}z$	$\bar{x}yz$	$xy\bar{z}$	
0	0	0	1	0	0	0	0	1
0	0	1	0	0	0	0	0	0
0	1	0	0	1	0	0	0	1
0	1	1	0	0	0	1	0	1
1	0	0	0	0	0	0	0	0
1	0	1	0	0	1	0	0	1
1	1	0	0	0	0	0	1	1
1	1	1	0	0	0	0	0	0

Q3)

B) $\bar{A}\bar{B}C\bar{D} + AB\bar{C}\bar{D} + \bar{A}\bar{B}CD + \bar{A}\bar{B}\bar{C}\bar{D}$ $\quad 2^4 = 16$

A	B	C	D	$\bar{A}\bar{B}C\bar{D}$ +	$AB\bar{C}\bar{D}$ +	$\bar{A}\bar{B}CD$ +	$\bar{A}\bar{B}\bar{C}\bar{D}$	
0	0	0	0	0	0	0	1	1
0	0	0	1	0	0	0	0	0
0	0	1	0	1	0	0	0	1
0	0	1	1	0	0	1	0	1
0	1	0	0	0	0	0	0	0
0	1	0	1	0	0	0	0	0
0	1	1	0	0	0	0	0	0
0	1	1	1	0	0	0	0	0
1	0	0	0	0	0	0	0	0
1	0	0	1	0	0	0	0	0
1	0	1	0	0	0	0	0	0
1	0	1	1	0	0	0	0	0
1	1	0	0	0	1	0	0	1
1	1	0	1	0	0	0	0	0
1	1	1	0	0	0	0	0	0
1	1	1	1	0	0	0	0	0

Q4)

a) $BC + DE(B\bar{C} + DE)$

Sol:-

$BC + B\bar{C}DE + DE(1+1)$ Domain 4

$BCDE + B\bar{C}DE + DE$

b) $BC(\bar{C}\bar{D} + CE)$

Sol:-

$BC\bar{C}D + BC(CE)$ Domain 4

$BC\bar{C}D + BC(CE)(D+\bar{D})$ $D + \bar{D} = 1$

$BC\bar{C}D + BC(CDE + C\bar{D}E)$

$\cancel{BC\bar{C}D + BC}$

$BC\bar{C}D + BCCDE + BCC\bar{D}E$

c) $B + C(BD + (C+\bar{\bar{D}})E)$

Sol Domain 4

$B + C(BD + CE + \bar{D}E)$ $C + \bar{C} = 1$

$B + [BCD + C(CE) + C\bar{D}E)]$ $\bar{\bar{D}} + \bar{D} = 1$

$E + \bar{E} = 1$

$B(C+\bar{C}) + [BCD + C(CE) + C\bar{D}E)]$

$BC + B\bar{C} + [BCD + C(CE) + C\bar{D}E))$

$\cancel{BC + B\bar{C} + BE +}$

$BC + B\bar{C}(D+\bar{D}) + [BCD + C(CE) + C\bar{D}E]$

$BCD + B\bar{C}D + B\bar{C}\bar{D} + [BCD + C(CE) + C\bar{D}E]$

$(BCD + B\bar{C}D + B\bar{C}\bar{D}(E+\bar{E}1) + [BCD + C(CE) + C\bar{D}E)$

$BCDE + BCD\bar{E} + B\bar{C}DE + B\bar{C}D\bar{E} + B\bar{C}\bar{D}E + D\bar{C}\bar{D}\bar{E} + [BCD + C(CE)$
$+ C\bar{D}E]$