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Paper : DLD

Mid Term

QUESTION No:1

Convert each of number to required number system.

(A) $(1011100.10101 = (\ )_{10}$

SOLUTION:

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

$$= 64 + 16 + 8 + 4 \cdot 0.5 + 0.0625 + 0.03125 \cdot 0.59375$$

$(92.59375)_{10}$ Ans.

(B) 111100.101

SOLUTION:

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

$$32 + 16 + 8 + 4 \cdot 0.5 + 0.0625$$

$(60.5625)_{10}$

(C) $(ABCD)_{16}$

SOLUTION:

A = 1010, B = 1011, C = 1100, D = 1101

$(1010101111001101)_2$

(D) $(10)_{10}$

SOLUTION:

$$\frac{10}{16} = 0.625 \times 16$$

$(A)_{16}$ Ans

(E) $(7777)_8$

SOLUTION:

$7\times8^3 + 7\times8^2 + 7\times8^1 + 7\times8^0$

$3584 + 448 + 56 + 7$

$(4095)_{10}$ Ans

(F) $(7777)_8 = (\cdots)_2$

$(111111111111)_2$

(G) $(7777)_8$

SOLUTION:

$(7777)_8 = (4095)_{16}$

$\frac{4095}{16} = 255.9375 \Rightarrow 16\times0.9375 = 15(F)$

$\frac{255}{16} = 15.9375 \Rightarrow 16\times0.9375 = 15(F)$

$\frac{15}{16} = 0.9375 \times 16 = 15_F$

$(FFF)_{16}$

(H) $(1010\,1111)_2 = (\cdots)_8$

$\underset{2}{010}\,\underset{5}{101}\,\underset{7}{111}$

$(257)_8$

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(i) $(101010)_{10} = (\ldots)_8$

SOLUTION:

$\frac{101010}{8} = 12626.25 \Rightarrow 0.25 \times 8 = 2$

$\frac{12626}{8} = 1578.25 \Rightarrow 0.25 \times 8 = 2$

$\frac{1578}{8} = 197.25 \Rightarrow 0.25 \times 8 = 2$

$\frac{197}{8} = 24.625 \Rightarrow 0.625 \times 8 = 5$

$\frac{24}{8} = 3$

$(35222)_8$ Ans.

(j) $(98)_{10} = (\ldots\ldots)_{BCD}$

SOLUTION:

9 8

1001 1000

$(10011000)_{BCD}$ Ans.

Q2 Apply De-Morgan's theorems to each expression.

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

SOLUTION:

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

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

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

$$= \bar{A} + B + C\bar{D}$$

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

SOLUTION:

$$\overline{A+\bar{B}+C+\bar{D}} + \overline{A\bar{B}C\bar{D}}$$

$$= \bar{A}\,\bar{\bar{B}}\,\bar{C}\,\bar{\bar{D}} + \bar{A} + \bar{B} + \bar{C} + \bar{\bar{D}}$$

$$= \bar{A}B\bar{C}D + \bar{A} + \bar{B} + \bar{C} + D$$

Question No 3:

A $\bar{X}\bar{Y}\bar{Z} + \bar{X}Y\bar{Z} + X\bar{Y}Z + \bar{X}YZ + XY\bar{Z}$

Truth table:

X	Y	Z	
0	0	0	$\bar{X}\bar{Y}\bar{Z} = 1$
0	0	1	0
0	1	0	$\bar{X}Y\bar{Z} = 1$
0	1	1	$\bar{X}YZ = 1$
1	0	0	0
1	0	1	$X\bar{Y}Z = 1$
1	1	0	$X\bar{Y}Z = 1$
1	1	1	0

B $\bar{A}\bar{B}CD + A\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}CD + \bar{A}\bar{B}\bar{C}\bar{D}$

Truth Table :

A	B	C	D	
0	0	0	1	$\rightarrow \bar{A}\bar{B}\bar{C}D$
0	0	0	0	0
0	0	1	1	$\rightarrow \bar{A}\bar{B}CD = 1$
0	0	1	0	$\rightarrow \bar{A}\bar{B}CD = 1$
0	1	0	1	0
0	1	0	0	0
0	1	1	1	0
0	1	1	0	0
1	0	0	1	0
1	0	0	0	0
1	0	1	1	0
1	0	1	0	0
1	1	0	1	$\rightarrow A\bar{B}\bar{C}D = 1$
1	1	0	0	0
1	1	1	1	0
1	1	1	0	0

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Question No 4

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

$= BC + B\bar{C}DE + DE \cdot DE$

$DE \cdot DE = DE$

$= BC + B\bar{C}DE + DE$

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

$= BC + DE$

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

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

By rule No. 8 $A \cdot \bar{A} = 0$

$B \cdot 0 \cdot \bar{D} + BCCE$

$BCCE$

By rule No 7 $C \cdot C = C$

BCE

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

$B + C[BD + CE + DE]$

$B + BCD + CCE + C\bar{D}E$

By rule No 7 $C \cdot C = C$

$B + BCD + CE + C\bar{D}E$

By rule no 10 $A + AB = A$

$B + CE(1 + \bar{D})$

By rule No 2 $\bar{A} + 1 = 1$

$B + CE(1)$

$B + CE$ Answer.