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SUBJECT - Digital Lojical & Design

Deparment - BS(SE) - 3

sec - (A)

Q No 1: convert each of the number to required number system.

(A) $(1011\ 1001\ 0101)_2 = (\ )_{10}$

Sol.

$(\underbrace{1011}\ \underbrace{1001}\ \underbrace{0101})_2 = (\ )_{10}$

$(1195)_{10}$

(B) $(111100.101)_2 = (\ )_{10}$

Sol

$(111100.101)_2 = (\ )_{10}$

$000111100101 = (\ )_{10}$

$(1145)_{10}$

(C) $(ABCD)_{16} = (\ )_2$

Sol:

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

$(1010101111001101)_2$

A = 1010

B = 1011

C = 1100

D = 1101

(P.T.O)

(D) $(10)_{10} = (\ )_{16}$

Sol:

$(10)_{10} = 16$

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

$0.625 \times 16 = 10 = 1$

$= (1)_{16}$

(E) $(7777)_8 = (\ )_{10}$

Sol;

$(7777)_8 = (\ )_{10}$

$7 \times 8^3 + 7 \times 8^2 + 7 \times 8^1 + 7 \times 8^0$

$3584 + 448 + 56 + 7$

$(4095)_{10}$

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

Sol:

In truth table of octal

$(7777)_8 = (\ )_2$

$7 = 111$

$(111111111111)_2$

(G) $(7777)_8 = (\ )_{16}$

Sol. $(7777)_8 = (\ )_{16}$

$\frac{7777}{16} = 486.0625 = 0.0625 \times 16 = 1$

$\frac{486}{16} = 30.375 = 0.375 \times 16 = 6$

$\frac{30}{16} = 1.875 = 0.875 \times 16 = 14 = 1$

$\frac{1}{16} = 0.0625 = 0.625 \times 16 = 1$

$(1161)_{16}$

(H) $(10101111)_2 = (\ )_8$

Sol: $\underbrace{010}_{2}\underbrace{101}_{5}\underbrace{111}_{7} = (\ )_8$

in truth table of octal

$(257)_8$

(I) $(101010)_{10} = (\ )_8$

Sol.

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

$\frac{101010}{8} = 12625.025 = 0.25 \times 8 = 2$

$\frac{12625}{8} = 1578.125 = 0.125 \times 8 = 1$

$\frac{1578}{8} = 197.25 = 0.25 \times 8 = 1$

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

$\frac{24}{8} = 3 = \cancel{0.3 \times}$.

$(3511)_8$

(5)

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

Sol,

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

$(10011000)_{BCD}$

$\longleftrightarrow$

Q no 2: Apply De-Morgan theorem, to each expression.

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

Sol

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

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

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

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

Sol

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

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

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

$\longleftrightarrow$

Q no 3 Develope a truth table for each of following SOP expression

(A) $\bar{x}\bar{y}\bar{z} + \bar{x}y\bar{z} + x\bar{y}z + \bar{x}yz + xy\bar{z}$

Sol. truth table for

$\bar{x}\bar{y}\bar{z} + \bar{x}y\bar{z} + x\bar{y}z + \bar{x}yz + xy\bar{z}$

x	y	z	
0	0	0	$\bar{x}\bar{y}\bar{z} = 1$
0	0	1	$\rightarrow 0$
0	1	0	$\bar{x}y\bar{z} = 1$
0	1	1	$\bar{x}yz = 1$
1	0	0	$\rightarrow 0$
1	0	1	$x\bar{y}z = 1$
1	1	0	$x\bar{y}\bar{z} = 1$
1	1	1	$\rightarrow 0$

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

Sol.

truth table for
$\bar{A}\bar{B}\bar{C}\bar{D} + AB\bar{C}\bar{D} + \bar{A}\bar{B}CD + \bar{A}\bar{B}C\bar{D}$

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

Q No 4,
Convert the following to sum of product (SOP) form

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

Sol:

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

$$BC + DEB\bar{C} + DEDE$$

$$BC + DEB\bar{C} + DE \qquad D \cdot D = D$$

$D + U$

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

Sol.

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

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

$$0+BCCE \qquad C.\bar{C}=0,\quad C.C=C$$

$$BCE$$

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

Sol.

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

$$B+CBD+CEC+CE\bar{D}$$

$$B+CBD+CE+CE\bar{D} \qquad C.C=C$$