

Page ①

Name:-

Rehmat ullah

I D :-

16284

Subject Name:-

Digital Logic Design.

Instructor :

M. Khalid Hamid.

Submission Date:-

30/11/2020

\* — \* — \* — \* — \* — \*

Q 1.

Convert each of number to the required number system:

$$A. (1011100.10101)_2 = (\dots)_{10}$$

Solution:-

$$\begin{array}{cccccccc} 6 & 5 & 4 & 3 & 2 & 1 & 0 & -1 & -2 & -3 & -4 & -5 \\ 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 \\ 1 & 0 & 1 & 1 & 1 & 0 & 0 & . & 1 & 0 & 1 & 0 & 1 \end{array}$$

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

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

$$92.65625$$

<sub>10</sub>

Answer

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

Solution:-

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

$\begin{matrix} 5 & 4 & 3 & 2 & 1 & 0 & -1 & -2 & -3 \\ 2^2 & 2^1 & 2^0 & 2^{-1} & 2^{-2} & 2^{-3} & & & \\ 1 & 1 & 1 & 1 & 0 & 0 & 1 & 0 & 1 \end{matrix}$   
 $111100.101$

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

$60 + 0.5 + 0.125$

$60.625_{10}$

Answer

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

Solution:-

$(ABCD)_{16}$

A B C D

$1010 \ 1011 \ 1100 \ 1101$

$1010 \ 1011 \ 1100 \ 1101_2$

Answer

\* — \* — \* — \* — \* — \* — \* — \*  
 (D)  $(10)_{10} = (\dots)_{16}$

Solution:-

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

(A)  
 $16$  Answer

Page (3)

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

Solution:-

$$(7777)_8$$

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

$$3584 + 448 + 56 + 7$$

$$(4095)_{10}$$

Answer

\* — \* — \* — \* — \* — \* — \* — \* — \*

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

Solution:-

$$\begin{array}{cccc} 7 & 7 & 7 & 7 \\ 111 & 111 & 111 & 111 \end{array}$$

$$(1111111111111111)_2$$

Answer

\* — \* — \* — \* — \* — \* — \* — \*

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

Solution:-

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

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

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

Page (4)

$$\frac{1578}{8} = 197.25 \rightarrow 0.25 \times 8 = 2 \text{ (111)}$$

$$\frac{197}{8} = 24.625 \rightarrow 0.625 \times 8 = 5 \text{ (1111)}$$

$$\frac{24}{8} = 3 \rightarrow 0 \text{ (111111)}$$

$$\frac{3}{8} = 0.375 \rightarrow 375 \times 8 \approx 3 \text{ (101)}$$

$$(305225)$$

Answer

\* \* \* \* \*

$$(J) \quad (98)_{10} = (\dots)_{BCD}$$

Solution:-

98	2	98
	2	49-0
9 8	2	24-1
1001 1000	2	12-0
	2	6-0
0011 0001	2	3-0
↓ ↓	2	1-1
3 1		

(31)

BCD

Answer

\* \* \* \* \*

Page 5

$$(g) (7777)_8 = (\dots)_{16}$$

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

$$3584 + 448 + 56 + 7$$

(4095)

10

$$\frac{4095}{16} = 255.9375 \rightarrow 0.9375 \times 16 = F$$

$$\frac{255}{16} = 15.9375 \rightarrow 0.9375 \times 16 = F$$

$$\frac{15}{16} = 0.9375 \rightarrow 0.9375 \times 16 = F$$

(FFF)

16 Answer

\* — \* — \* — \* — \*

$$(h) (10401111)_2 = (\dots)_8$$

010 101 111 111 111

2 5 7

(257)<sub>8</sub>

Answer

\* — \* — \* — \* — \*

Q 4 convert the following expression to sum-of-products (sop forms)

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

Solution:-

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

Converting to SOP form:

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

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

Using Rule No 7  $A \cdot A = A$

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

Using Rule No 2  $A + 1 = 1$

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

$$BC + DE$$

Required SOP form

Page (7)

Q4 B  
Sol:

Q4 B

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

Solution:

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

converting to SOP form

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

$$= BCC\bar{D} + BCCE$$

using Rule NO 8  $A \cdot \bar{A} = 0$

$$B\bar{D}(0) + BCCE$$

$$BCCE$$

using Rule NO 7  $A \cdot A = A$

$$X = BCE$$

Required SOP form

this SOP form is single product term.

Q4

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

Converting to SOP form.

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

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

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

Using Rule No. 2,  $A + 1 = 1$

$$B + CCE + CE\bar{D}$$

Using Rule No. 7  $A \cdot A = A$

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

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

using Rule No. 2  $A + 1 = 1$

$$X = B + CE$$

Required SOP Ans. form.



Q 2

(A)

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

Applying De-morgan's law.

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

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

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

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

Answer

\* — \* — \* — \* — \*

(2) (B)

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

Applying De-morgan's law.

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

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

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

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

Answer

Q 3

A.

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

Solution:-

input s			outputs
x	y	z	
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0

Q 3  
B

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

inputs				outputs	
A	B	C	D	net	output
0	0	0	0	1	
0	0	0	1	0	
0	0	1	0	1	
0	0	1	1	1	
0	1	0	0	0	
0	1	0	1	0	
0	1	1	0	0	
0	1	1	1	0	
1	0	0	0	0	
1	0	1	0	0	
1	0	1	1	0	
1	1	0	0	1	
1	1	0	1	0	
1	1	1	0	0	
1	1	1	1	0	

THE Finished