# Mid Term

ID : 16236

Subject Name : Digital Logic Design

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S.E (Sec A)

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# QUESTION # 1

Q1: Convert each of number to the required number System.

## Part (a).

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

Solution:

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

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

$$\Rightarrow 64 + 16 + 8 + 4 + 0.5 + 0.0625 + 0.03 + 12$$

$$\Rightarrow 92.0.593.$$

$$\Rightarrow (92.593)_{10}$$

Answer.

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# Part (B).

b- $111100.101_2 = (\ldots)_{10}$

Solution:-

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

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

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

$$= (60.562)_{10}$$

Answer.

# Part (C).

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

Solution:-

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

| A | B | C | D |
|---|---|---|---|
| 1010 | 1011 | 1100 | 1101 |

$$(ABCD)_{16} = (1010111100 1101)_2$$

Answer

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# Part (D)

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

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

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

$(A)_{16}$ Answer.

# Part (E)

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

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

$7^{8^3} \quad 7^{8^2} \quad 7^{8^1} \quad 7^{8^0}$

$7 \times 512 + 7 \times 64 + 7 \times 8 + 7$

$3584 + 448 + 56 + 7$

$(4095)_{10}$ Answer.

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## Part (F).

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

Solution:-

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

$(111111111111)_2$

Answer.

## Part (G)

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

Solution:-

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

$\frac{4095}{16} = 255.937 \quad 16 \times 0.937 = F$

$\frac{255}{16} = 15.937 \quad 16 \times 0.937 = F$

$\frac{15}{16} = 0.937 \quad 16 \times 0.937 = F$

$(FFF)_{16}$. Answer

# Part (H)

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

Solution:-

$$\underline{10}\ \underline{101}\ \underline{111}$$

$$\downarrow \quad \downarrow \quad \downarrow$$

$$2 \quad 5 \quad 7$$

$$= (257)_8$$ Answer.

# Part (I)

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

Solution:-

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

9 8

1001 1000

$(1001\ 1000)_{BCD}$

# Part (I)

i). $(10101.0)_{10} = (..)_8$

Solution:-

$\frac{10101}{8} = 12626.25 \Rightarrow 0.25 \times 8$

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

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

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

$(35222)_8$ Answer.

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# QUESTION #2

## Part (A).

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

Solution:-

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

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

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

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# QUESTION #2
## Part (B)

b. $\overline{\bar{A}+\bar{B}+C+\bar{D}} + \overline{\bar{A}BC\bar{D}}$

Solution:-

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

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

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

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# QUESTION # 3

## Part (A)

**A.** $\bar{X}\bar{Y}\bar{Z} + \bar{X}y\bar{Z} + X\bar{Y}Z + \bar{X}YZ + Xy\bar{Z}$

Solution:-

### 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 | → $Xy\bar{Z} = 1$ |
| 1 | 1 | 1 | → 0 |

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B. # QUESTION #3

## Part (B).

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

Solution:-

## Truth Table:

| A | B | C | D | |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | → $\bar{A}\bar{B}\bar{C}\bar{D}=1$ |
| 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | → $\bar{A}\bar{B}CD=1$ |
| 0 | 0 | 1 | 1 | → $\bar{A}\bar{B}CD=1$ |
| 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 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 0 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | → $A\bar{B}\bar{C}\bar{D}=1$ |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 0 |

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# QUESTION # 4

## Part (a)

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

Solution:-

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

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

$DE \cdot DE = DE$

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

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

$\Rightarrow B\bar{C} + 1 = 1$

$\Rightarrow BC + DE$.

Answer.

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# Part (B).

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

Solution:-

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

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

$B \cdot 0 \cdot D + BCCE$

$BCCE$

by rule no 7 $C \cdot C = C$

$BCE$

Answer.

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# Part (C).

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

Solution:-

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

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

by rule no 7 $C \cdot C = C$

~~$B + CE$~~

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

by rule no 10 $A + AB = A$

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

by rule no 2 $A + 1 = 1$

$B + CE(1)$

$B + CE$

Answer.