Name Younas Khan
ID 12422
Subject Digital logic end Design(theory)
Instructor Muhammad Amin

Q.No2: (a) $45.25_{10} = (\quad)_2$

Sol:

45.25

$= (4\times10^1)+(5\times10^0)+(2\times10^{-1})+(5\times10^{-2})$

$= (4\times10)+(5\times1)+(2\times0.2)+(5\times0.01)$

$= 40 + 5 + 0.2 + 0.05$

(b) $10000000.1010_2 = (?)_{10}$

Sol:

1 0 0 0 0 0 0 0 . 1 0 1 0

$2^7+2^6+2^5+2^4+2^3+2^2+2^1+2^0 \cdot 2^{-1}+2^{-2}+2^{-3}+2^{-4}$

$128+64+32+16+8+4+2+1 \cdot 0.5+0.25+0.125+0.0$

$10000000.1010_2 = (255.9375)_{10}$

(c) $4D7F_{16} = (\quad)_{10}$

$= (4\times16)+(13\times16)+(7\times16)+(15\times16)$

$= 64 + 208 + 112 + 240$

$= 624_{10}$

(d) $128_{10} = (?)16$

Sol: $\frac{128}{16} = 8 \rightarrow 8\times16 = C8$

$\frac{8}{16} = 0.5 \rightarrow 0.5\times16 = 8$

$(8C8)16$

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(e) $3A6F_{16} = (?)_{10}$.

$(3 \times 16) + (A \times 16) + (6 \times 16) + (F \times 16)$

$(3 \times 16) + (10 \times 16) + (6 \times 16) + (15 \times 16)$

$48 + 160 + 96 + 240$

$= (544)_{10}$

(f) $1100001111001011_2 = (?)_{16}$

$2^{15} + 2^{14} + 2^{13} + 2^{12} + 2^{11} + 2^{10} + 2^9 + 2^8 + 2^7 + 2^6 + 2^5 + 2^4 + 2^3$

$32,768 + 16384 + 8,192 + 4096$ $\quad 2^2 + 2^1 + 2^0$

$2048 + 1024 + 512 + 256 + 128 + 64 + 32$

$16 + 8 + 4 + 1$

1100 0011 1110 0101

C 3 E 5

$1100\ 0011\ 1110\ 0101_2$ $(C3E5)_{16}$

(g) $6173_8 = (?)_{10}$

$(6 \times 8^3) + (1 \times 8^2) + (7 \times 8^1) + (3 \times 8^0)$

$(6 \times 512) + (1 \times 64) + (7 \times 8) + (3 \times 1)$

$3072 + 64 + 56 + 3$

$= (3193)_{10}$

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(h) $169_{10} = (?)_8$

$1 \times 10^2 + 6 \times 10^1 + 9 \times 10^0$

$1 \times 100 + 6 \times 10 + 9 \times 1$

$100 + 60 + 9$

$(169_8$

(I) $2A7D_{16} = (\ )_8?$

$(2 \times 16^3) + (A \times 16^2) + (7 \times 16^1) + (D \times 16^0)$

$(2 \times 16^3) + (9 \times 16^2) + (7 \times 16^1) + (13 \times 16^0)$

$(2 \times 4096) + (9 \times 256) + (7 \times 16) + (13 \times 1)$

$8192 + 2304 + 112 + 13$

10621_8

(J) $11111111 = \pm(?)_{10}$

11111111 Add 1 — 2nd ~~1st~~ complement

\+ 1 ~~Add~~ ±

11111111

Add 1 — 2nd complement

11111111 $(11111111)_{10}$

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(k) $-12_{10} = (\quad)_2$

0000110
+1
0000111

$-12_{10} = (0000111)_2$

(l) $198_{10} = (?)_{BCD}$

1 9 8

0001 1001 1000

$198_{10} = 0001\ 1001\ 1000$

(m) $100001110000 = (\quad)_{10}$

1000 0111 0000

8 1 0

810_{10}

(n) $1001010_2 = (\quad)_{Gray}$

1001010

Binary to Gray

$(1101110)_{Gray}$.

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(O) $10101111_{Gray} = (?)_2$

1010 1111

$(1110\ 1001)_2$

(P) 0100 0001 = ( ) ASCII

$01000001 = (22)_{ASCII}$

Symbol

''

(Q) $111000 = (?111000)$ Even parity.

111000 is even

its divisable by 2

remmeler = 0

(111000) Even parity.

QNO2:

(a) $01111111_2 - 00000111_2$

$$\begin{array}{r} 01111111 \\ -\ 00000111 \\ \hline 01.1.1.1000 \\ +\ 1 \\ \hline 01111001 \end{array}$$

using 2nd complement

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(b) $01101010_2 \times 11110001_2$

```
  01101010
x 11110001
----------
  01100080
         1      2nd complement
----------
  01100001
```

(c) $10001000_2 \div 00100010_2$

```
  10001000
÷ 00100010
----------
  00000000
         +1     2nd complement
----------
  00000001
----------
```

(d) $6D_{16} - 3F_{16}$

$0110\ 1101 - 0011\ 1111$

```
    1 1 1 1
  01101101
- 00111111
----------
  10010000      2nd complement
        +1
----------
  10010001
----------
```

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(e) $00010110_{BCD} + 00010101_{BCD} = (?)_{16}$

0001 0110 + 00010101

```
   1    11
  0001  0110
+ 0001  0110
------------
  0010  1100
```

```
  16
+ 16
----
  32
```

QNO3:

11010011_2 1010_2

S R

```
1010 ) 11010011000 (
       1010
       -----------
       01110011000
        1010
       -----------
        0100011000
         1010
       -----------
          001011000
            1010
       -----------
            0001000
               1010
       -----------
               0010
```

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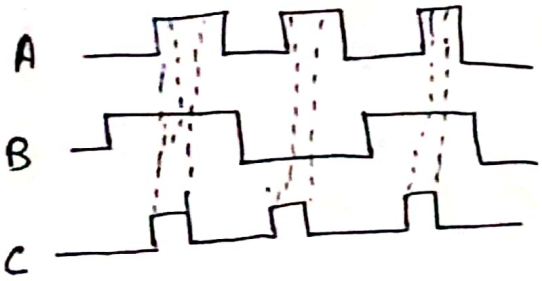
QNO4:: Apply CRC to detect the error.

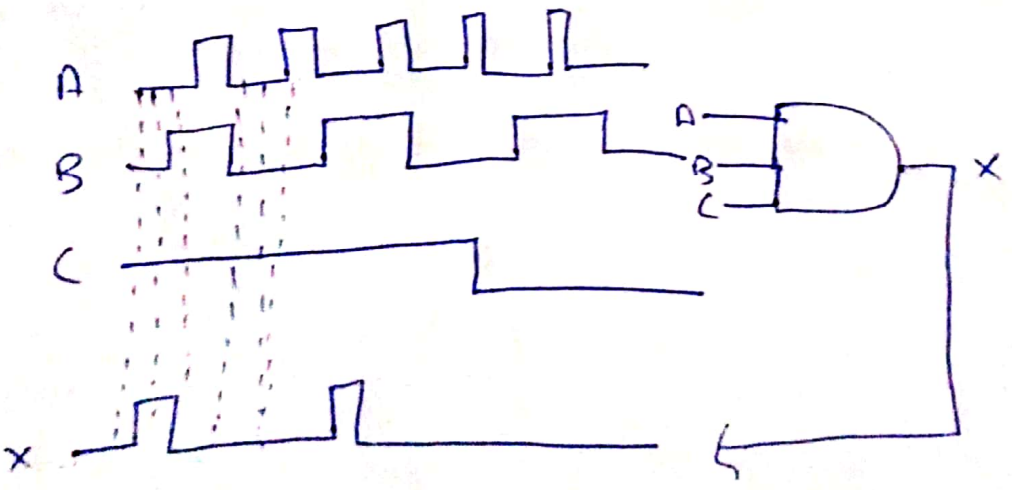
```
1010 ) 11010011010 (
       1010
       ----
       0010 011010
         1010
         ----
         0000 11010
              1011
              ----
              0011 1010
                   1010
                   ----
                   0010 10
                        1010
                        ----
                        0010
```

QNO5:



Sol:: The output waveform x of the 3 inputs And gate is High only when all three input waveform A, B C are High.

Sol::



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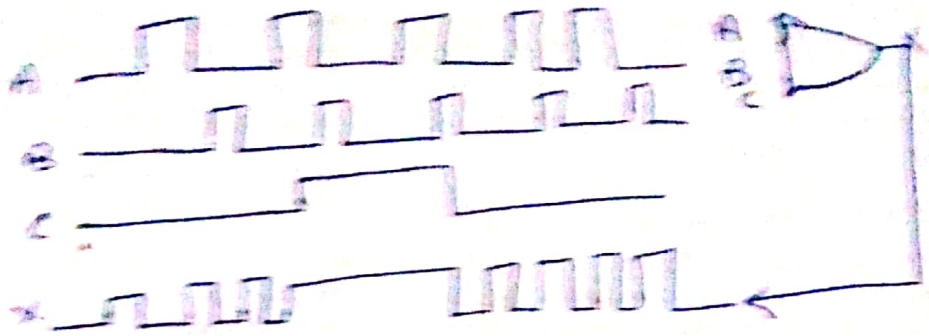
Q6 OR Gate

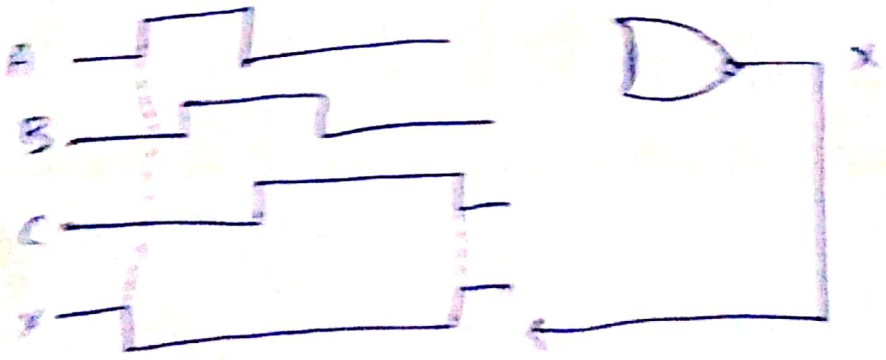


Sol:- The output is high when one or more of the inputs waveforms are high as indicated by the output waveform x on timing diagram.

Q NO7:- 3-input NAND gate

Sol:- The output waveform x is low only when all three inputs waveforms are high as shown in the timing diagram.

Q8:- 3-input NOR gate



Sol:- The output x is low when any input is high as shown by output waveform x on the timing diagram.

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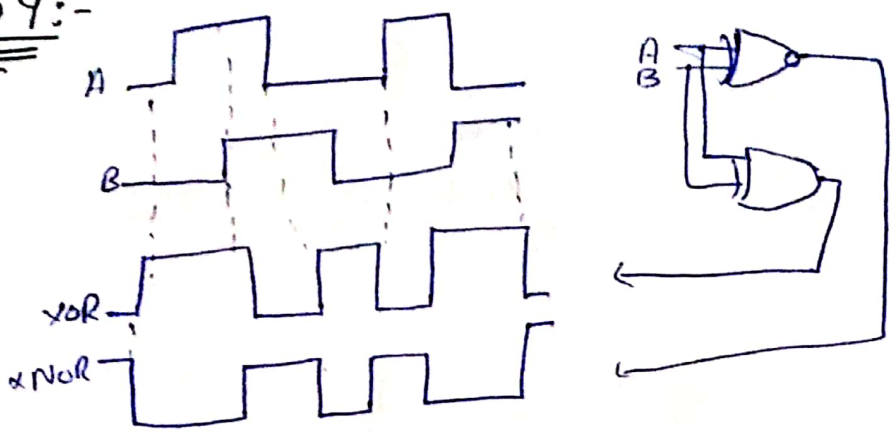
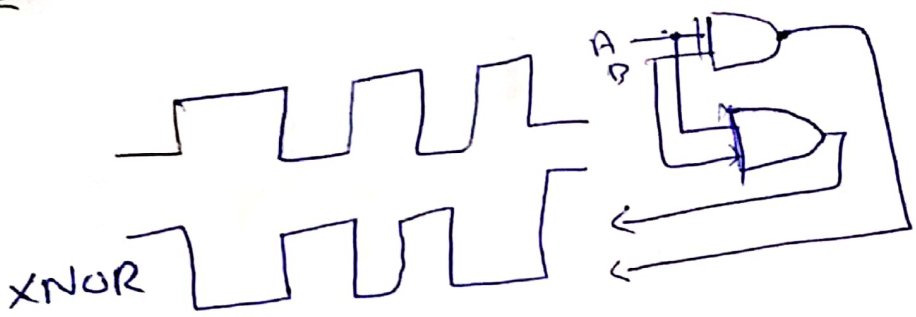
Q NO 9:-



Sol:
⇒ The outputs waveform are shown in figure 2 Notice the XOR outputs is High only when both inputs are at opposite levels. Notice that the XNOR output is high only when both inputs are the same.

Q NO 10:- XNOR



Q NO 11:- using Boolean algebra techniques.

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

$A\bar{B}(1+C) + A\bar{B}CD(1+E)$

$A\bar{B}(1) + A\bar{B}CD(0)$

$A\bar{B}(CD)(1)$

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

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

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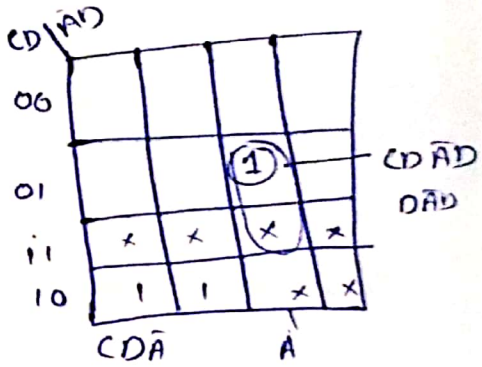
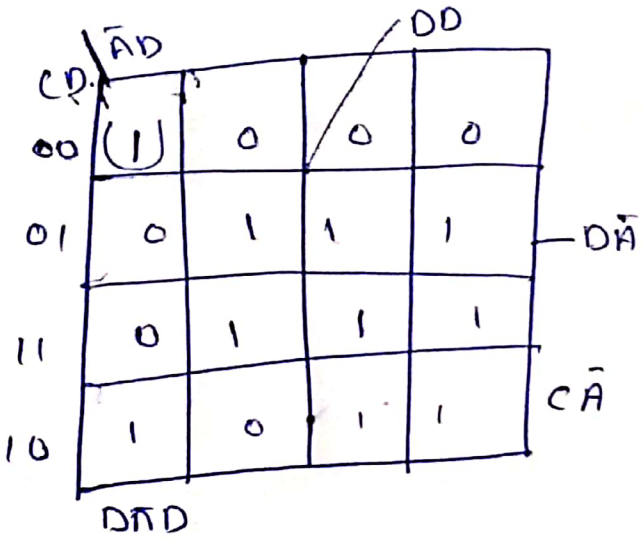
Q12:-

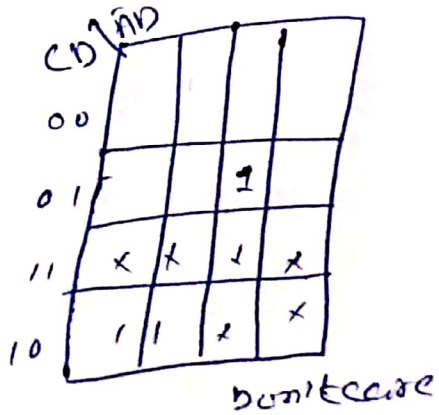
input				output
A	B	C	D	V
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	x
1	0	1	1	x
1	1	0	0	x
1	1	0	1	x
1	1	1	0	x
1	1	1	1	x

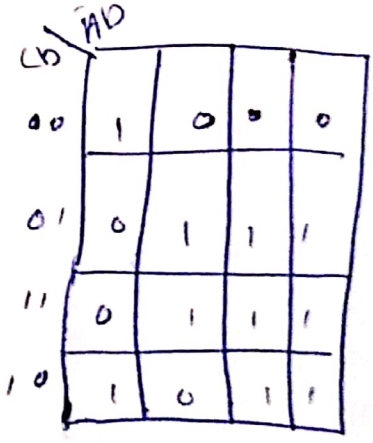


Q13:-



Q14:-





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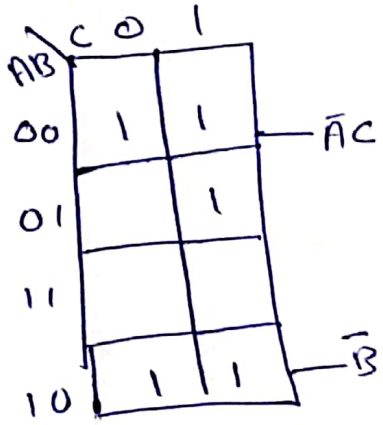
Q NO 15:- $\bar{A}\bar{B}\bar{C} + \bar{A}BC + A\bar{B}C + ABC$

Sol:- The binary value of the expression are

000 + 011 + 101 + 100

map the standard SOP expression and group the cells are show in figure



Q NO 16:- Notice the warp around the 4 cell group that includes the top row and the bottom row of 1s. The remaining 1 is absorbed in overlapping group of two cell. The group of four 1s. produce a single variable term.

* that is the minimum expression is equivalent to the original standard expression.

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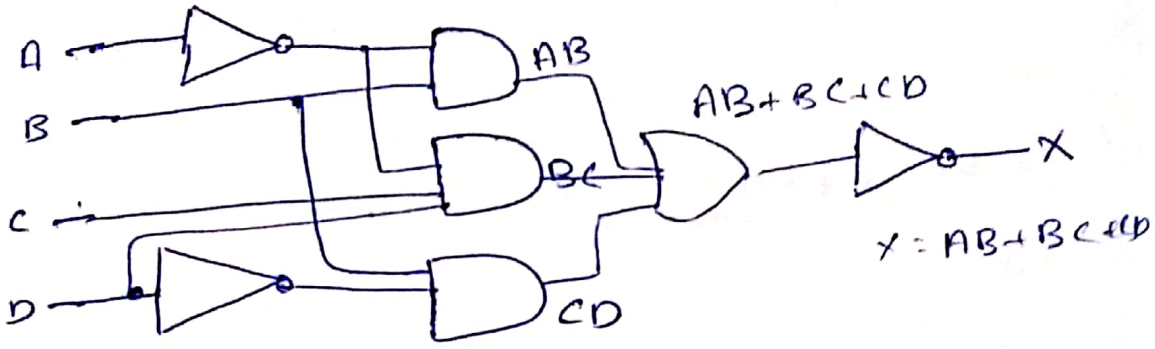
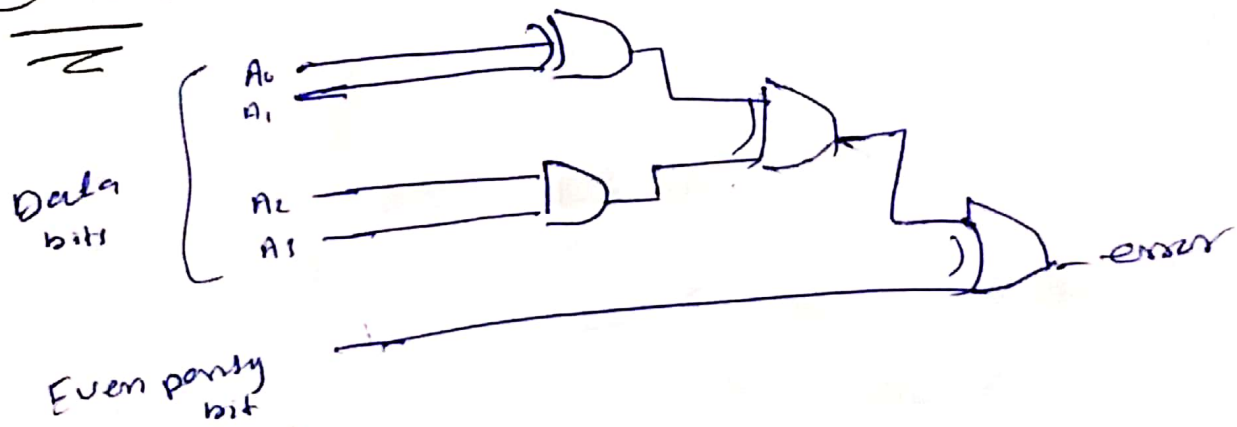
Q17



QNO18:- NOR gate



Sol:- The circuit in figure produce a 1 output where there is an error in the five bits code and a 0 when there is no error.

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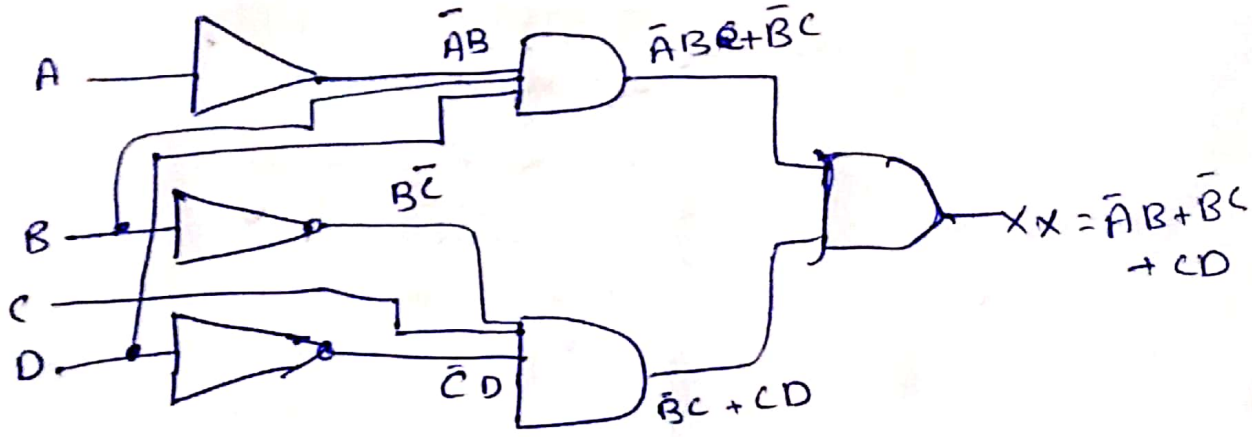
Q No (19) :.

A	B	C	D	X
0	0	0	0	0
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	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1



The end