Haroon Rashid

Reg# 16549

Semester :6th

Subject: DLD Assignment

Submitted to: Sir MUHAMMAD AMIN

Q1

Answer:

Qa:- $45.25_{10} = (\ \ )_2$

$\frac{45.25}{2} = 22.625 = 0.625 = 0$

$\frac{22}{2} = 11 \quad = \quad 0$

$\frac{11}{2} = 5.5 = 0.5 \times 2 = 1$

$\frac{5}{2} = 2.5 = 0.5 \times 2 = 1$

$\frac{2}{2} = 1$

$(0\ 0 1 1 1)_2$

(b)

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

10000000.1010

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

$= 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ .\ 1\ 0\ 1\ 0$

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

Value of zero will not be consido

$= 2^7\ .\ 2^{-1}+2^{-3}$

$= 128\ .\ 05 + 0.125$

$=$

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

4	D	7	F
0100	1101	0111	1111

$4D7F_{16} = 0100\ 1101\ 0111\ 1111$

$= 0100\ 1101\ 01111111$

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

$\frac{128}{16} = 8$

$\frac{8}{16} = 0.5 = 0.5 \times 16 = 8$

8 Ans:-

(e) $3A6F_{16} = (\ )_2$

3A6F = 0011 1010 0110 1111 (3, A, 6, F)

= 0011 1010 0110 1111

(f) ~~11000~~ $110000111110010 1_2 = (\ )_{16}$

110001111100101

At first there is 1 digit less so we add one digit

0110 0011 1110 0101

6 3 E 5

63E5

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

$6173_8 = (6 \times 8^3) + (1 \times 8^2) + (7 \times 8^1) + (3 \times 8^0)$

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

$= 3{,}072 + 64 + 56 + 3$

$= 3{,}195_{10}$

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

$\frac{169}{8} = 21.125 \rightarrow 0.125 \times 8 = 1$

$\frac{21}{8} = 2.625 \rightarrow 0.625 \times 8 = 5$

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

Ans: $(152)_8$

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

$2A7D_{16}$

= 2A7D

2 10 7 13

0010 1010 0111 1101

0010101001111101

if we add two zero for last one but we can take all zero so we neglate last zero

010 101 001 111 101

= 421 421 421 421 421

2 5 1 7 5

$= (25175)_8$

(j) $11111111_2 = \pm(?)_{10}$

(a) The bits & their powers-of-two weights for the positive number are as follows

Solution

2^7 2^6 2^5 2^4 2^3 2^2 2^1 2^0

1 1 1 1 1 1 1 1

128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 =

2's Complement is 255

(L) 198 = ($)_{BCD}$

198 = 1 9 8

0001 1001 1000

Ans = 000110011000 BCD

(M) $100001110000_{BCD} = (?)_{10}$

1000 0111 0000

8 7 0

Ans:- $(870)_{10}$

(N) $1001010_2 = (?)$ Gray

1 → + → 0 → + → 0 → + → 1 → + → 0 → + → 1 → + → 0

1 1 0 1 1 1 1

1101111 Gray

(O) 10101111 Gray = $(?)_2$

1 0 1 0 1 1 1 1

1 1 0 0 1 0 1 0

$(11001010)_2$

(P). 0100 0001= (?)ASCII

0100001

Symbol=	Dec	Binary	Hex
!	33	0100001	21

(q) 111000=(?1111000) Even Party

Solution- Make the parity bit either 1 or 0 as nessary to make the total number of 1s even. The parity bit will be the left most bit.

111000

Even 1's

1111000 Even Party

Q2. Calculate each of the following

(a) $01111111_2 - 00000111_2$

(01111111 + (−00000111))

```
  01111111
+ 00000111
  --------
  01111000
```

2's complement (−00000111)

01111000 Ans:-

(b) $01101010_2 \times 11110001_2$

```
   01101010
  +11110001
  ---------
   01101010
 + 00000000
 ----------
  001101010
 +00000000
 -----------
  0001101010
 +00000000
 ------------
  00001101010
 +01101010
 ------------
  01110000101 0
 +01101010
 ------------
 01010001001010
 01101010
 ------------
 11010011001010
 01101010
```

2's complement

1111001110010 10

0000110001101 01

Now we attached Signed bit

100001100011 0101

Ans:-

1111001110010 10

(c) $10001000 \div 00100010_2$

Step1:- The sign of both numbers are positive, so the quotient will be positive. The quotient is intially zero: 00000000

Step2:- Subtract the Division from the dividend using 2's complement addition (final carries are discarded)

```
  10001000   Dividend
+ 00100010   2's complement of divisor
  10101010   Positive 1st partial remainder
```

Add 1 to quotient: 0000000 + 0000000 = 0000000

Step3: Subtract the drivisor from the 1st partial remainder using 2's complement addition

```
  10101010   1st Partial remainder
+ 00100010   2's complement of divisor
  10001000   Positive 2nd partial remainder
```

Add 1 to quotient: 00000001 + 0000000 = 00000010

Step 4:- Subtract the divisor from the 2nd partial remainder using 2's complement addition.

```
  10001000   2nd Partial remainder
+ 00100010   2's complement of divisor
  00000000   zero remainder
```

Add 1 to quotient: 00000010 + 0000001

= 00000011 (final quotient)

The process is complete.

Q2 (e) $00010110_{BCD} + 00010101_{BCD} = (?)_{10}$

```
  0001 0110        1
                   1 6
+ 0001 0101      + 1 5
-----------      -----
  0010 1011        3 1
```

Right group
So this invalid BCD (>9)

```
  0 010 1011     left group is valid
      + 0110     Add 6 to invalid code. Add
-------------
  0011  0001     Carry, 0001, to next group.
   3     1       Valid BCD number
```

QUEATION:3:

Q3- Apply CRC to the data bits 11010011₂ using the generator code 1010₂ to Produce the transmitted CRC code.

G = 1010

Solution:

Since the generator code has four data bits, add four 0s to the data byte. The appended data (D') is

D' = 110100110000

Divide the appended data by the generator code using the modulo-2 operation until all bits have been used

$$\frac{D'}{G} = \frac{110100110000}{1010}$$

```
110100110000
1010
 1110
 1010
  1000
  1010
    1011
    1010
     1000
     1010
       100
```

The transmitted CRC is 110100110100

Q4. Assume that the produced in problem Q3 incurs an error in the most significant bit during transmission. Apply CRC to detect the error.

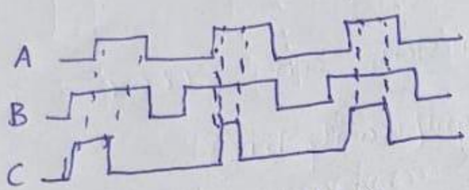
Solution- During Transmission, an error occurs in the most significant bit

Solution :- Applying the CRC process to the received data to detect the error

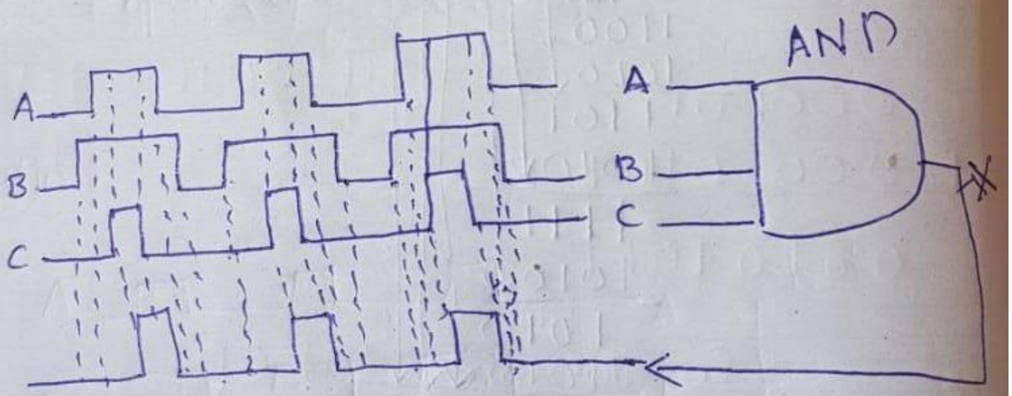
```
100100110100
1010
----
 1100
 1010
 ----
  1101
  1010
  ----
   1111
   1010
   ----
    1010
    1010
    ----
     0100
```

Remainder= 0100. Since it is not zero, an error is indicated.

Q5. The input wave forms in Figure 1 is applied to a ~~@~~ a 3 input AND gate. Show the output wave form in proper relation to the inputs with a timing diagram



Solution.. ~~Ø~~ The Diagram show ~~suppose~~ that the all three inputs are high only

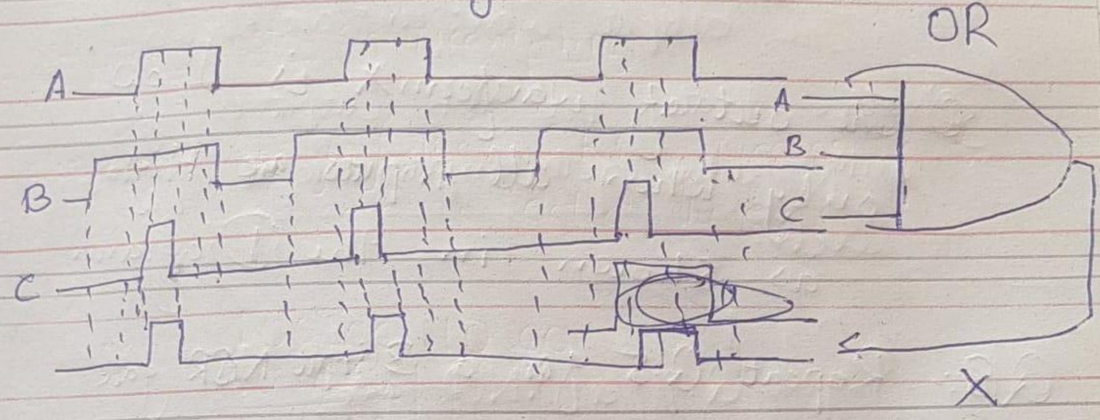


A, B & C are all High during ~~Ø~~ three intervals, therefore, X is High.

The output waveform X is High only when both ~~A~~ & B wave forms are High as shown in the ~~Ø~~ above Diagram

Q6- Repeat Q5 for a 3 input OR gate

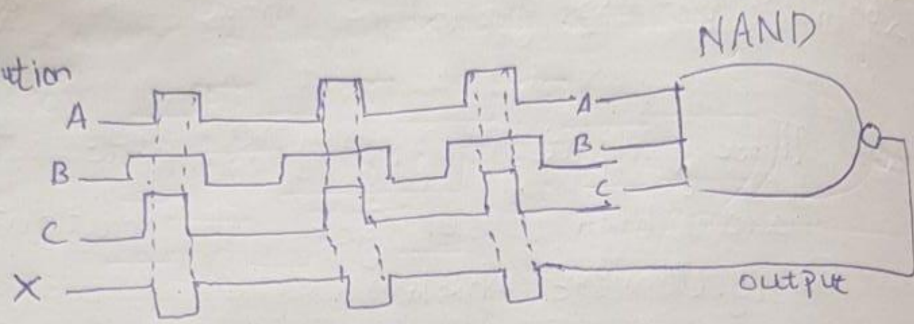
Solution:- Three inputs for OR gate the are high so for the output will be high



The output wave form of a 3 input OR gate is High when either one are all high.

Q7:- Repeat Q.5 for 3 input ~~OR~~ NAND gate

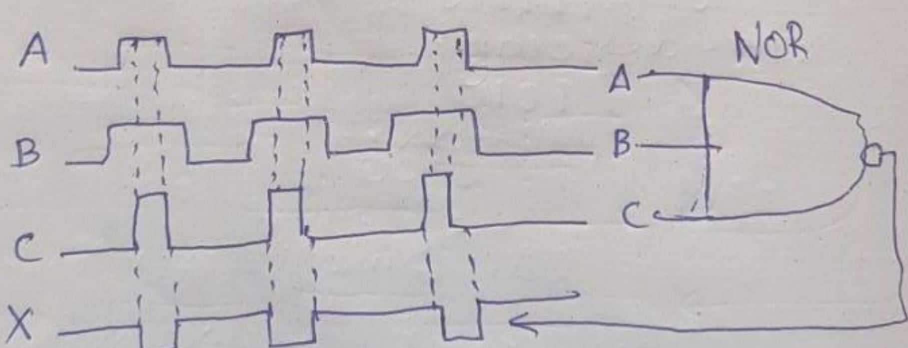
Solution



The out of waveform X is Low only when all inputs are High as shown in the Diagram

Q8:- Repeat Q.5 for a 3 input NOR gate

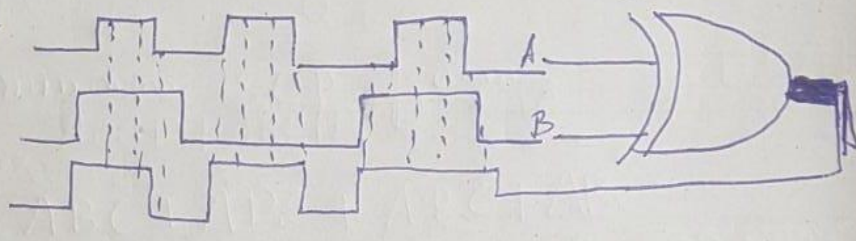
Solution



The output X is Low when any input is High as shown by the output waveform X in the timing diagram

Q9:- The input waveforms in Figure 2 is applied to a XOR gate. Show the output waveform in proper relation to the inputs with a timing diagram.

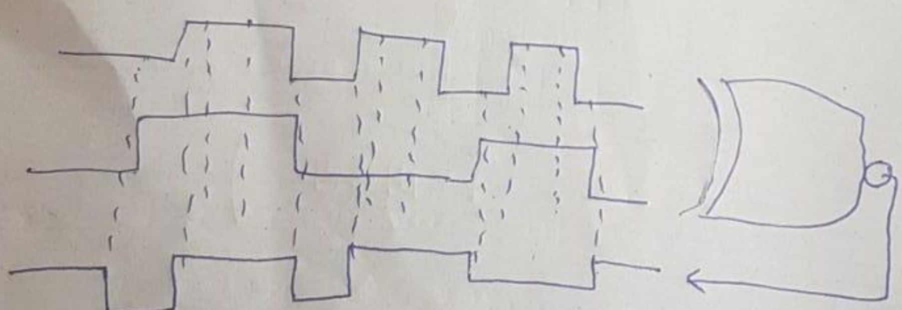
Solution:-



The output waveforms are shown
Notice that the XOR output is High only when both inputs are at opposite levels.

Q10:- Repeat Q.9 for XNOR gate.

Solution



The XNOR output is High only when both inputs are the same level

Q12. Convert the following expressions into Standard SOP forms $(C+D)(A'+D)$

$= ABCD + ABC(D+D') + (A'+A)BCD + ABC(D+D')$

$= ABCD + ABCD + ABCD' + (A'BCD + ABCD) + ABCD + ABCD'$

$= ABCD + ABCD + ABCD' + A'BCD + ABCD + ABCD + AB...$

1111 + 1111 + m_{14} + m_7 + m_{15} + m_{15} + m...

m_{15} m_{15} Solve with 8421

$ABCD = 1111$

$= ABCD' = 1110$

$A'BCD = 0111$

$= m_{15} + m_{14} + m_7$

$= \sum(m\ 15, 14, 7)$ Ans.

Q15 :- Use a Karnaugh map to Simplify the following expression to a minimum SOP form

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

Solution

C \ AB	00	01	11	10
0	1		1	
1		1		1