Mid Exam Summer

Submitted By:

Hamza Riaz (12282)

BS (SE-8) Section: A

Submitted To:

Sir Amin

Dated: 22st August 2020

Department of Computer Science,
IQRA National University, Peshawar Pakistan

Q1)

a) $45.25_{10} = (?)_2$

2	45
2	22 — 1
2	11 → 0
2	5 — 1
2	2 — 1
	1 — 0

Happened $45_{10} = 101101_2$

Now .25

0	.25
.	2
0	5
~~x~~	2
1	0

$0.25_{10} = 0.01$

$= 101101_2 + 0.01_2$

101101.01_2

b)

$0111111.1010_2 = (?)_{10}$

Solution:

$0111111.1010_2 = 0.2^7 + 1.2^6 + 1.2^5 + 1.2^4 + 1.2^3 +$
$1.2^2 + 1.2^1 + 1.2^0 + 1.2^{-1} + 0.2^{-2} + 1.2^{-3} + 0.2^{-4}.$
$= 0 + 64 + 32 + 16 + 8 + 4 + 2 + 1 + 0.5 + 0 +$
$0.125 + 0$
$= 127.625_{10}$

c) $3A6F_{16} = (?)_2$

Solution:

3	A	6	F
0011	1010	0110	1111

$3A6F_{16} = (0011101001101111)_2$

e) $-1_{10} = (?)_2$

Solution:

$-1_{10} = (?)_2$

$$\begin{array}{r|r|l} 2 & -1 & \\ \hline & 0 & 1 \end{array}$$

$(1) = (-1)_2$

f) 156_{10}

Solution:-

$156_{10} = (\_\_\_\_)_{BCD}$

1	5	6
0001	0101	0110

$(156)_{10} = (000101010110)_{BCD}$

d)

$(10101010)_2 = (\ ?\ )_{10}$

Solution:

$(10101010)_2 = (\_\_\_\_)_{10}$

10101010

$= 1 \times 2^7 + 0 \times 2^6 + 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$

$= 170 \Rightarrow (10101010)_2 = (170)_{10}$

g) $1001010_2 = (?)_{Gray}$

Solution:

$1001010 = ?$

$g_6 = b_6 = 1$

$g_5 = b_6 \oplus b_5 = 1 \oplus 0 = 1$

$g_4 = b_5 \oplus b_4 = 0 \oplus 0 = 0$

$g_3 = b_4 \oplus b_3 = 0 \oplus 1 = 1$

$g_2 = b_3 \oplus b_2 = 1 \oplus 0 = 1$

$g_1 = b_2 \oplus b_1 = 0 \oplus 1 = 1$

$g_0 = b_1 \oplus b_0 = 1 \oplus 0 = 1$

$1001010_2 = (1101111)$ Gray Code

h) $111000 = (101001)_{Even\,parity}$

Solution:-

101001 is odd since its not divisible by 2,

As remainder is equal to 1, when divided by (2)

Answer# 2:

Q2

a) $9B_{16} + 8A_{16}$

Solution:

$$
\begin{array}{cccc}
 & 1 & & \\
1 & 9 & B \\
+ & 8 & A \\
\hline
 & 2 & 5
\end{array}
$$

1) $B_{16} + A_{16} = 11_{10} + 10_{10}$

$\Rightarrow 21_{10}$

$= 16 \times 1 + 5 \Rightarrow 15_{16}$

Sum $= 5$, carry $= 1$

2)

$= 1 + 9_{16} + 8_{16}$

$= 1 + 9_{10} + 8_{10}$

$= 18_{10} \Rightarrow 16 \times 1 + 2$

$= 12_{16}$

Sum $= 2$, carry $= 1$

b) $F7_{16} - D6_{16}$

Sol:-

$$
\begin{array}{ccc}
 & F & 7 \\
- & D & 6 \\
\hline
 & 2 & 1
\end{array}
$$

$\therefore\ 7 - 6,\ 7 > 6$

So, $\Rightarrow 7 - 6 \Rightarrow 1_{16}$

$\therefore\ F - D,\ F = 15,\ D =$

$\Rightarrow 15 - 13 = 2_{16}$

c)

$1100_2 + 1011_2$

Sol:-

$$\begin{array}{rcccc} & \textcircled{1}\,1 & 1 & 0 & 0 \\ + & 1 & 0 & 1 & 1 \\ \hline & 0 & 1 & 1 & 1 \end{array}$$

1)

$\therefore 0_2 + 1_2 \Rightarrow 0_{10} + 1_{10}$

$\Rightarrow 1_{10} = 1_2$

Sum = 1

2)

$\therefore 0_2 + 1_2 \Rightarrow 0_{10} + 1_{10}$

$= 1_{10} \Rightarrow 1_2$

Sum = 1

3)

$\therefore 1_2 + 0_2 \Rightarrow 1_{10} + 0_{10}$

$\Rightarrow 1_{10} = 1_2$

Sum = 1

4)

$\therefore 1_2 + 1_2 \Rightarrow 1_{10} + 1_{10}$

$2_{10} \Rightarrow 2 \times 1 + 0$

$= 10_2$, Sum = 0, carry

d) $01111111_2 - 00000111_2$

Sol:-

$$\begin{array}{rcccccccc} & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ - & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 \\ \hline & 0 & 1 & 1 & 1 & 1 & 0 & 0 & 0 \end{array}$$

Answer# 3:

XNOR output wave $\overline{A \oplus B}$

0 1 0 1 0 1

Q3)

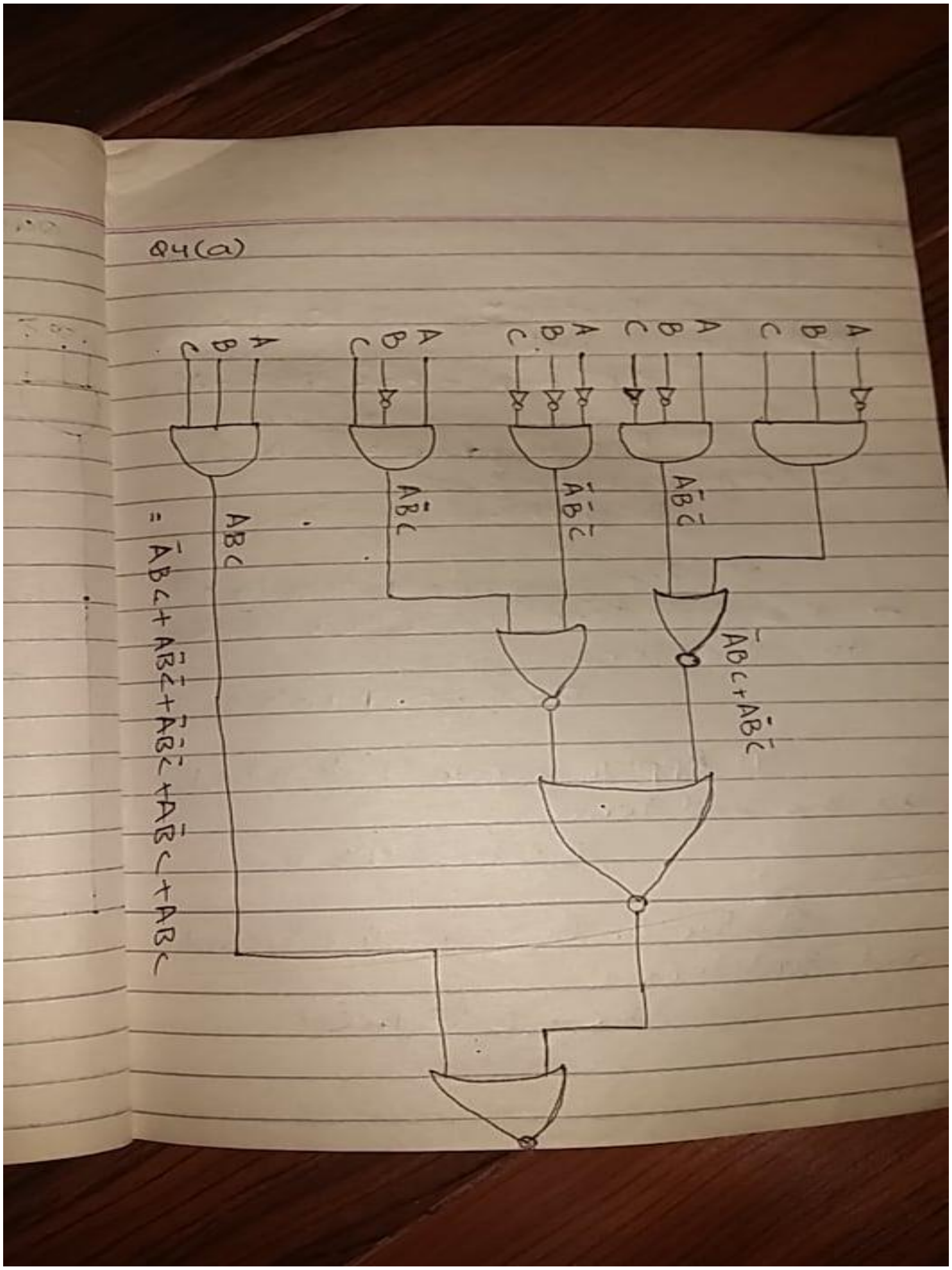
XOR output wave $A \oplus B$

1 0 1 0 1

XNOR output wave $\overline{A \oplus B}$

0 1 0 1 0

Answer# 4(A):



Answer# 4(B):

b)

Solution:

1) Factor BC out of the first & last

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

2) Applying rule 6 ($\bar{A}+A=1$) to the term in paranthesis

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

3) Applying rule 4 (drop the 1) to the first term and rule 6 ($\bar{C}+C=1$) to the term

$$BC + AB\cdot 1 + \bar{A}\bar{B}\bar{C}$$

4) Applying rule 4 (drop the 1) to the 2nd term

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

5) Factor $\bar{B}$ from the second and 3rd terms

and 3rd terms

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

6) Apply rule 11 $(A+\bar{A}\bar{C} = A+\bar{C})$ to the term in parenthesis

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

7) Use the distributive and commutative laws to get the following expression:

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

Q5

a) $A = \overline{\overline{X+Y}+Z}$

Sol:-

$$A = \overline{\bar{X} + \bar{Y} + \bar{Z}}$$

$$A = \bar{\bar{X}} \mathbin{\bar{+}} \bar{\bar{Y}} + \overline{Z}$$

$$A = X \cdot Y \cdot Z$$

part(b)

$$A = XY\bar{Z}$$

There are total 8 combinations the SOP contains 1 of these, So the POS must contains the other 7 which are

000, 010, 011, 100, 101, 110, 111

$$(X+Y+Z)(X+\bar{Y}+Z)(X+\bar{Y}+Z)(\bar{x}+y+z)$$
$$(\bar{x}+y+\bar{z})(\bar{x}+\bar{y}+z)(\bar{x}+\bar{y}+\bar{z})$$

part (C)

X	Y	Z	Expressions
0	0	0	$(x+y+z)$
0	0	1	$(x\ y\ \bar{z})$
0	1	0	$(x+\bar{y}+z)$
0	1	1	$(x+\bar{y}+z)$
1	0	0	$(\bar{x}+y+z)$
1	0	1	$(\bar{x}+y+\bar{z})$
1	1	0	$(\bar{x}+\bar{y}+z)$
1	1	1	$(\bar{x}+\bar{y}+\bar{z})$

Q6(a)

$$X = \bar{A}\bar{B}\bar{C} + A\bar{B}\bar{C} + \bar{A}B\bar{C} + AB\bar{C} + ABC + A\bar{B}C$$

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

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

b)

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

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