SYED SAMROZE ALI 22K-4187

ASSIGNMENT #01

— Q1 —

— (b) —

(a) 63.3456

2	63 — 1
2	31 — 1
2	15 — 1
2	7 — 1
2	3 — 1
	1

$0.3456 \times 2 = 0.6912$

$0.6912 \times 2 = 1.3824$

$0.3824 \times 2 = 0.7648$

$0.7648 \times 2 = 1.5296$

$0.5296 \times 2 = 1.0592$

$0.0592 \times 2 = 0.1184$

$0.1184 \times 2 = 0.2368$

$0.2368 \times 2 = 0.4736$

$0.4736 \times 2 = 0.9472$

$0.9472 \times 2 = 1.8944$

They cannot be fully represented!

(111111.010110000 1)

(b) 47.9232

2	47 — 1
2	23 — 1
2	11 — 1
2	5 — 1
2	2 — 0
2	1

(2)

$0.9232 \times 2 = 1.8464$
$0.8464 \times 2 = 1.6928$
$0.6928 \times 2 = 1.3856$
$0.3856 \times 2 = 0.7712$
$0.7712 \times 2 = 1.5424$
$0.5424 \times 2 = 1.0848$
$0.0848 \times 2 = 0.1696$
Ext.

$0.1696 \times 2 = 0.3392$
$0.3392 \times 2 = 0.6784$

They cannot be fully represented!

(10111.111011000)
↳ Ans

(a)

(a) 100110101.1010

$\Rightarrow (2^8 \times 1) + (2^7 \times 0) + (2^6 \times 0) + (2^5 \times 1) + (2^4 \times 1) + (2^3 \times 0) + (2^2 \times 1) + (2^1 \times 0) + (2^0 \times 1) + (2^{-1} \times 1) + (2^{-2} \times 0) + (2^{-3} \times 1) + (2^{-4} \times 0)$

$\Rightarrow 256 + 32 + 16 + 4 + 1 + 0.5 + 1/8$

$\Rightarrow (309.625)_{10} \rightarrow$ Ans

(b) 10111001.11011

$(2^7 \times 1) + (2^6 \times 0) + (2^5 \times 1) + (2^4 \times 1) + (2^3 \times 1) + (2^2 \times 0) + (2^1 \times 0) + (2^0 \times 1) + (2^{-1} \times 1) + (2^{-2} \times 1) + (2^{-3} \times 0) + (2^{-4} \times 1) + (2^{-5} \times 1)$

$= 128 + 32 + 16 + 8 + 1 + 0.5 + 1/8 + 1/16 + 1/32$

$(185.84375)_{10} \rightarrow$ Ans

(c)

-127

(a) 1 1 1 1 1 0 0 1 → sign magnitude

(b) 1 0 0 0 0 1 1 0 → 1's complement

(c) 1 0 0 0 0 1 1 1 → 2's Complement

(d)

(a) $(1010)_{gray}$

GC 1 1 0 1

Binary 1 1 0 0 $(1100)_2$ → Ans

↓ → discarde

(b) $(00010)_{gray\ code}$

GC 0 0 0 1 0

Bin 0 0 0 1 1 $(0011)_2$ → Ans

(c) $(11000010001)_{gray\ code}$

1 1 0 0 0 0 1 0 0 0 1

1 0 0 0 0 0 1 1 1 1 0

$(10000611110)_2$ → Ans

(4)

(e)

(i)

2	68 – 0
2	34 – 0
2	17 – 1
2	8 – 0
2	4 – 0
2	2 – 0
	1

$(10111100)_2$ → Ans

↳ 8 bit 2's complement

(ii)

00 11 1001

8 4 2 1 8 4 2 1

3 9

$(39)_{16}$ → Ans

(iii) 1 1000001 01001001110001000000000

S	E	F
1	100001	01001001110001000000000

$$\text{Number} = (-1)^S (1+F)(2^{E-127}) \quad \because S=1$$

$$= (-1)^1 (1.01001001110001)(2^{129-127})$$

$$= (-1)(1.01001001110001)(2^2)$$

$$\text{Number} = (-101.001001110001)_2 \rightarrow \text{Ans}.$$

(v) 01100100 (BCD) + 00110011 (BCD) = ?

```
  0110 0100
+ 0011 0011
-----------
  1001 0111
  9    7
```

→ $(97)_{10}$

$(10001\ 0111)_2$ → Ans

(f)

(i) $(1110)_2 \times (1110)_2$

```
   1110
 × 1110
 ------
   0000
  1110x
 11100
 1110xx
1010100
1110xxx
--------
11001000
```

→ Ans.

(ii) $(110000)_2 - (1111)_2$

```
 1 2 2 2 2
 10000
-01111
-------
 00001
```

→ Ans

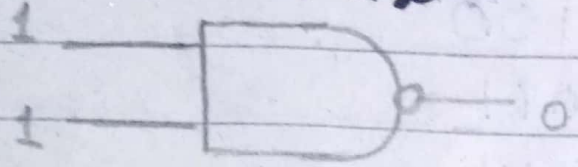
(iii)

```
     0011
101 | 1111
     -101
     ----
      0101
      -101
      ----
       xx
```

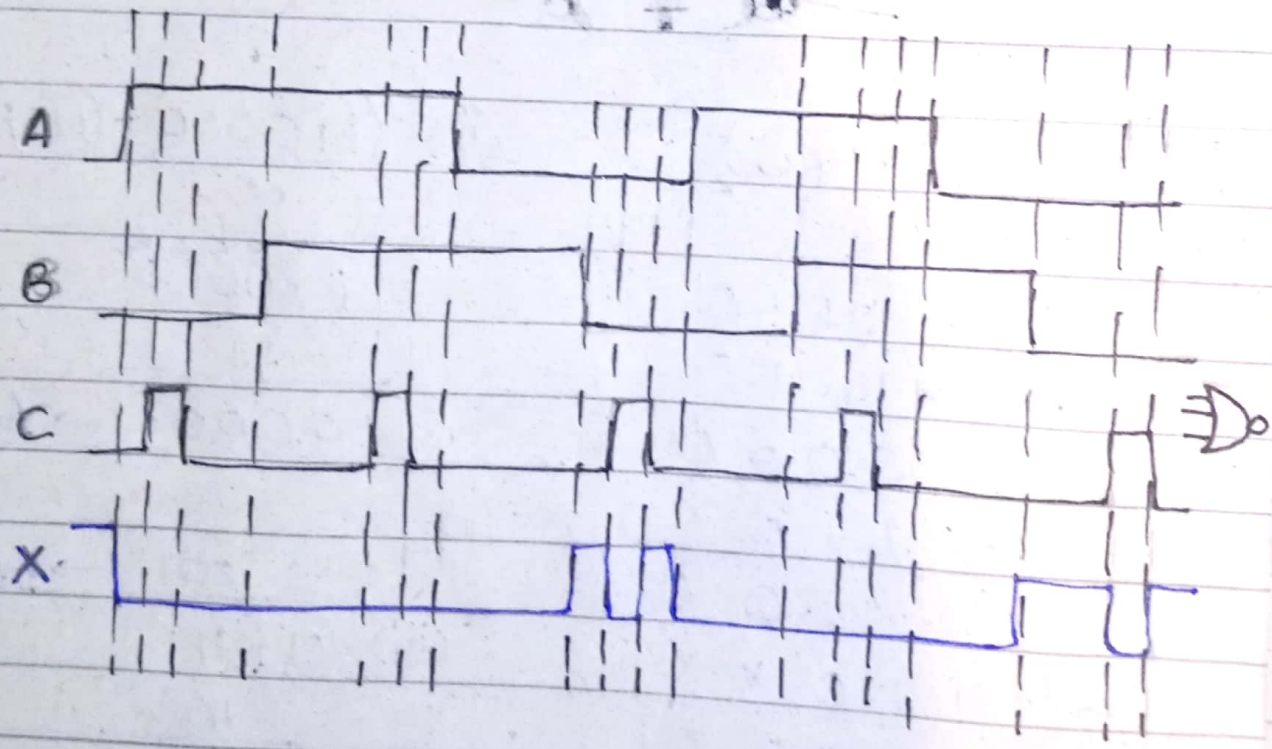
→ Ans.

Q2

(a)



(b)



Q3

(a)

$\overline{(A\overline{B})\cdot(\overline{B}+C)}+C$

$= [\overline{(A\cdot B)} + (\overline{B}+C)]\cdot C'$

$= [(AB) + (B+C)]\cdot C'$

$= [B(A+1)+C]\cdot C'$

$= (B+C)\cdot(CC')$

$= BC' + CC' \quad \rightarrow CC'=0$

$= BC' \longrightarrow$ Ans.

(b)

$X' + XY + XZ' + XY'Z'$

$\{X' + Y + XZ'(1+X')$

$X' + Y + XZ'(1)$

$X' + XZ' + Y$

$X' + Z' + Y \rightarrow$ Standar POS form

X	Y	Z	F
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

(8)

$X' + XY + XZ' + XY'Z'$ =

$X'(Y+Y')(Z+Z') + XY(Z+Z') + XZ'(Y+Y') + XY'Z'$

~~$X'YZ + X'YZ'$~~

$(X'Y + X'Y')(Z+Z') + XYZ + XYZ' + XZ'Y + XY'Z' + XY'Z'$

$X'YZ + X'YZ' + X'Y'Z + X'Y'Z' + XYZ + XYZ' + XZ'Y + XY'Z'$

$+ XY'Z'$

$X'YZ + X'YZ' + X'Y'Z + X'Y'Z' + XYZ + XYZ' + XY'Z'$ ↓ Standard SOP

011 010 001 000 111 110 101 100

3 2 1 0 7 6 5 4

Σ $X'+Y+Z'$ → Standard POS form

— 84 —

No. of bits to encode 0–9999 (decimal)

In binary → 1–14 bits

In BCD → 4–16 bits

27

↙ ↘

0010 0111

0000 0000 0010 0111