1) (i) **Data**

* Collected row facts
* Can not be used for Decision making.

Information

* Processed data
* Can be used for Decision making.

iv) a) 25.56_{10}

$= 2\times10^{1} + 5\times10^{0} + 5\times10^{-1} + 6\times10^{-2}$ //

b) BO_{16}

$= B\times16^{1} + 0\times16^{0}$

$= 11\times16^{1} + 0\times16^{0}$ //

v)

	binary	octal	hexadecimal
a) 41	101001_2	51_8	29_{16}
b) 132.45	10000100.0111_2	204.3463_8	84.7331_{16}
c) 2701	101010001101_2	5215_8	$A90_{16}$
d) 33.333	100001.0101_2	41.252_8	21.55_{16}

2|41
2|20 – 1
2|10 – 0
2|5 – 0
2|2 – 1
1 – 0

101001_2 //

2|132
2|66 – 0
2|33 – 0
2|16 – 1
2|8 – 0
2|4 – 0
2|2 – 0
1 – 0

10000100_2

$0.45\times2 = 0.90$
$0.90\times2 = 1.80$
$0.80\times2 = 1.60$
$0.60\times2 = 1.20$
$0.20\times2 = 0.40$

10000100.0111_2 //

2|2701
2|1350 – 1
2|675 – 0
2|337 – 1
2|168 – 1
2|84 – 0
2|42 – 0
2|21 – 0
2|10 – 1
2|5 – 0
2|2 – 1
1 – 0

101010001101_2 //

2|33
2|16 – 1
2|8 – 0
2|4 – 0
2|2 – 0
1 – 0

100001_2

$0.333\times2 = 0.666$
$0.666\times2 = 1.332$
$0.332\times2 = 0.664$
$0.664\times2 = 1.328$

0.0101

100001.0101_2

132.45

8|41
5-1

51_8

8|132
8|16-4
2-0

204_8

8|2701
8|337-5
8|42-1
8|5-2
0-5

5215_8

$0.45 \times 8 = 3.60$
$0.60 \times 8 = 4.80$
$0.80 \times 8 = 6.40$
$0.40 \times 8 = 3.20$

204.3463_8

8|33
4-1

41_8

$0.333 \times 8 = 2.664$
$0.664 \times 8 = 5.312$
$0.312 \times 8 = 2.496$

~~$0.333 \times 8 = 0.664$~~
~~$0.664 \times 8 =$~~

41.252_8

16|132
8-4

84_{16}

16|2701
16|169-5
10-9

A5

16|41
2-9

29_{16}

$0.45 \times 16 = 7.20$
$0.20 \times 16 = 3.20$
$0.20 \times 16 = 3.20$

84.739_{16}

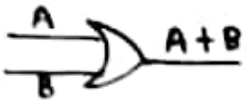
16|33
2-1

21_{16}

$0.333 \times 16 = 5.328$
$0.328 \times 16 = 5.248$

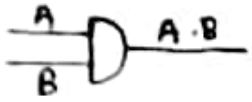
21.55_{16}

2) (i) or gate



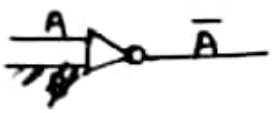
A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1

And gate



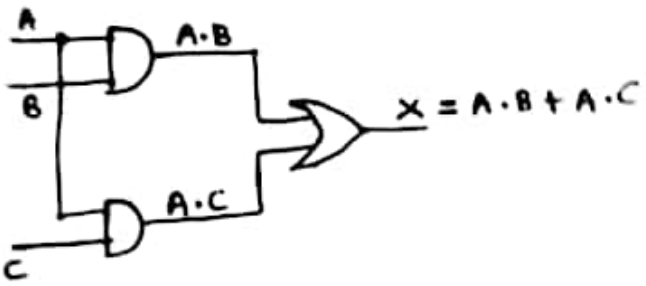
A	B	A·B
0	0	0
0	1	0
1	0	0
1	1	1

Not gate



A	$\bar{A}$
0	1
1	0

(iii)

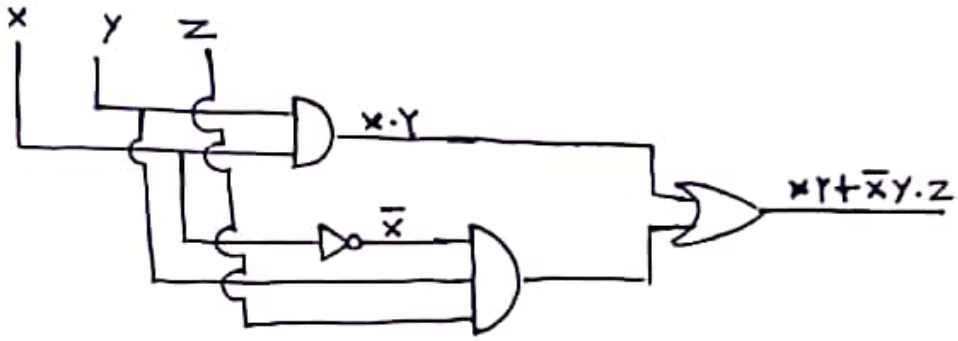


a) $A \cdot B + A \cdot C$

b)

A	B	C	A·B	A·C	A·B + A·C
0	0	0	0	0	0
0	0	1	0	0	0
0	1	0	0	0	0
0	1	1	0	0	0
1	0	0	0	0	0
1	0	1	0	1	1
1	1	0	1	0	1
1	1	1	1	1	1

(iv) $XY + \bar{X}Y.Z$



③(i)

	Octal	Decimal	Hexadecimal
01011010_2	132_8	90	$5A_{16}$
111110_2	76_8	62	$3E_{16}$
00110011_2	63_8	51	33_{16}

$01\,011\,010_2 = 132_8$

$111\,110_2 = 76_8$

$00\,110\,011_2 = 63_8$

$01011010_2 =$

$(1\times2^6)+(0\times2^5)+(1\times2^4)+(1\times2^3)+(0\times2^2)+(1\times2^1)+(0\times2^0)$

$= 64+0+16+8+0+2+0$

$= 90_{10}$

$111110_2 =$

$(1\times2^5)+(1\times2^4)+(1\times2^3)+(1\times2^2)+(1\times2^1)+(0\times2^0)$

$= 32+16+8+4+2+0$

$= 62$

110011_2

$(1\times2^5)+(1\times2^4)+0+0+(1\times2^1)+(1\times2^0)$

$= 32+16+2+1$

$= 51$

2017

A-10
B-11
C-12
D-13
E-14

$1011010_2 = 5A_{16}$

$11111_2 = 3E_{16}$

$110011_2 = 33_{16}$

(ii) a) 345.1

$= (3\times8^2)+(4\times8^1)+(5\times8^0)+(1\times8^{-1})$

$= 192 + 32 + 5 + \frac{1}{8}$

$= 229.125$ //

b) 107.05

$= (1\times8^2)+(0\times8^1)+(7\times8^0)+(0\times8^{-1})+(5\times8^{-2})$

$= 64 + 0 + 7 + \frac{1}{8} + 5\times\frac{1}{64}$

$= 71 + 0.125 + 0.078$

$= 71.203$ //

c) 0.243

$= 0 + (2\times8^{-1}) + (4\times8^{-2}) + (3\times8^{-3})$

$= 2\times\frac{1}{8} + 4\times\frac{1}{64} + 3\times\frac{1}{64\times8}$

$= 0.25 + \frac{1}{16} + \frac{3}{512}$

$= 0.25 + 0.0625 + 0.005$

$= 0.3175$ //

(iii) a) A15

$= A \times 16^2 + 1 \times 16^1 + 5 \times 16^0$

$= 10 \times 256 + 1 \times 16 + 5 \times 1$

$= 2560 + 16 + 5$

$= 2581$ //

b) 1FD

$= 1 \times 16^2 + F \times 16^1 + D \times 16^0$

$= 256 + 15 \times 16 + 13 \times 1$

$= 256 + 240 + 13$

$= 509$ //

(iv) a)

$$\begin{array}{r} 00110011_2 \\ +\ 01111110_2 \\ \hline 10001001_2 \end{array}$$

b)

$$\begin{array}{r} 10110110_2 \\ -\ 10101001_2 \\ \hline 00001101_2 \end{array}$$

(v)

(i) a) 2|28
2|14 – 0
2|7 – 0
2|3 – 1
1 – 1

11100_2

$-28 = 1\,0001100_2$ //

b) 2|123
2|61 – 1
2|30 – 1
2|15 – 0
2|7 – 1
2|3 – 1
1 – 1

1111011_2

$+123 = 0\,1111011_2$ //

c) 2|101
2|50 – 1
2|25 – 0
2|12 – 1
2|6 – 0
2|3 – 0
1 – 1

1100101_2

$-101 = 1\,1100101_2$ //

2017

(a) a)

2|79
2|39 - 1
2|19 - 1
2|9 - 1
2|4 - 1
2|2 - 0
1 - 0

1001111_2

$-79 = 1\ 1001111_2$

2|124
2|62 - 0
2|31 - 0
2|15 - 1
2|7 - 1
2|3 - 1
1 - 1

1111100_2

$+124 = 0\ 1111100_2$

$$\begin{array}{r} 1\ 1001111_2 \\ +0\ 1111100_2 \\ \hline 0\ 1001011_2 \end{array}$$

b)

2|23
2|11 - 1
2|5 - 1
2|2 - 1
1 0

10111_2

$-23 = 1\ 0010111_2$

2|22
2|11 - 0
2|5 - 1
2|2 - 1
1 - 0

10110_2

$+22 = 0\ 0010110_2$

$$\begin{array}{r} 1\ 0010111_2 \\ +0\ 0010110_2 \\ \hline 1\ 0101101_2 \end{array}$$

c)

2|110
2|55 - 0
2|27 - 1
2|13 - 1
2|6 - 1
2|3 - 0
1 - 1

1101110_2

$+110 = 0\ 1101110_2$

2|11
2|5 - 1
2|2 - 1
1 - 0

1011_2

$-11 = 1\ 0001011_2$

$$\begin{array}{r} 0\ 1101110_2 \\ -\ 1\ 0001011_2 \\ \hline 0\ 1100011_2 \end{array}$$

2017

(iv) a) 231_{10} 47_{10}

2 | 231
2 | 115 - 1
2 | 57 - 1
2 | 28 - 1
2 | 14 - 0
2 | 7 - 0
2 | 3 - 1
1 - 1

11100111_2

2 | 47
2 | 23 - 1
2 | 11 - 1
2 | 5 - 1
2 | 2 - 1
1 - 0

101111_2

$$
\begin{array}{r}
11100111_2 \\
+ \quad 101111_2 \\
\hline
100010110_2
\end{array}
$$

b) 130_8 = 001011000_2

101_8 = 001000001_2

$$
\begin{array}{r}
001011000_2 \\
+001000001_2 \\
\hline
10011001_2
\end{array}
$$

c) CE_{16} = 11001110_2

$1F_{16}$ = 00011111_2

$$
\begin{array}{r}
11001110_2 \\
-00011111_2 \\
\hline
10\,[illegible]\,01111_2
\end{array}
$$

A = 10
B = 11
C = 12
D - 13
E - 14
F - 15
G - 16
H - 17
I - 18