

MID-SEM (SPRING) - 2017
(DE - SOLUTION)

①

1) a) (i) $476.7 - 297.8$

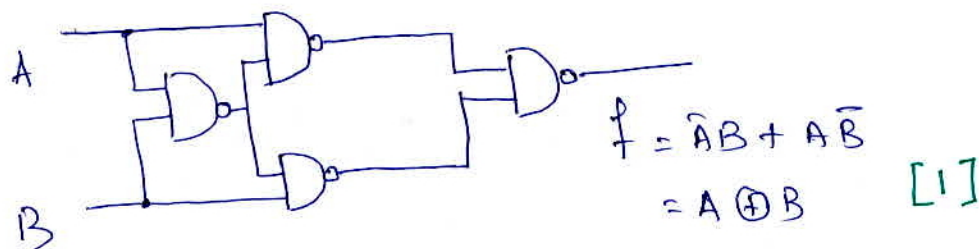
$$\begin{array}{r} 010001110110.0111 \\ - 001010010111.1000 \\ \hline 000111011110.1111 \\ - 01100110.0110 \\ \hline 000101111000.1001 \end{array} \quad \text{(Ans)} \quad [0.5]$$

(ii) $(-14) - (-6)$

2's complement of $-14 \rightarrow 11110010$
 $+6 \rightarrow 00000110$
 $\hline 11111000$
 $\downarrow 2's$
 $00001000 (-8) \quad \text{(Ans)} \quad [0.5]$

b) Defⁿ of Carry Look Ahead Adder - [0.5]
 Advantage over Ripple Carry Adder - [0.5]

c)



d) $1110110 \rightarrow c_1 = 1, c_2 = 1, c_3 = 0$

ie, $(011)_2 = (3)_{10} \quad [0.5]$

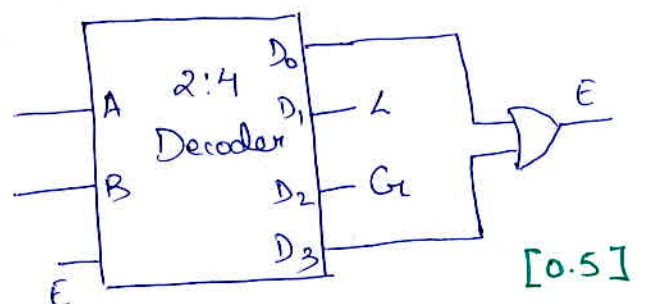
Correct word is 1100110

\Rightarrow 4 bit data is $0110 \quad [0.5]$

e)

A	B	L	E	G
0	0	0	1	0
0	1	1	0	0
1	0	0	0	1
1	1	0	1	0

[0.5]



2) $F(A, B, C, D) = \sum m(11, 12, 14) + d(3, 4, 6)$

(2)

[2]

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

$F = B\bar{D} + \bar{B}CD$ [1]

Diagram [2]

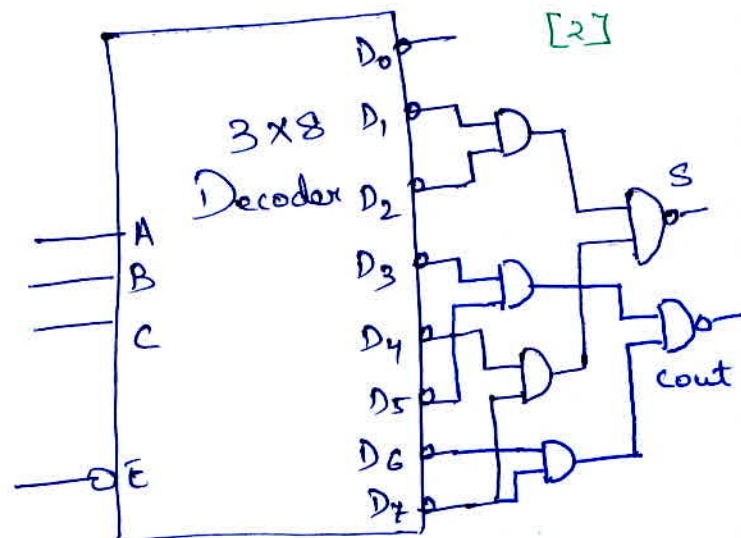
3) a) Full Adder

$S = \sum m(1, 2, 4, 7)$

$Cout = \sum m(3, 5, 6, 7)$

$S = m_1 + m_2 + m_4 + m_7$
 $= \bar{m}_1 \cdot \bar{m}_2 \cdot \bar{m}_4 \cdot \bar{m}_7$ [0.5]

$Cout = m_3 + m_5 + m_6 + m_7$
 $= \bar{m}_3 \cdot \bar{m}_5 \cdot \bar{m}_6 \cdot \bar{m}_7$ [0.5]



b) $f = \bar{A} + (\bar{A} \cdot \bar{B} + \bar{B} \cdot \bar{C}) + \bar{C}$

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

$= \bar{A} + \bar{B} + \bar{C} = \overline{A \cdot B \cdot C}$ [2]

4) a)

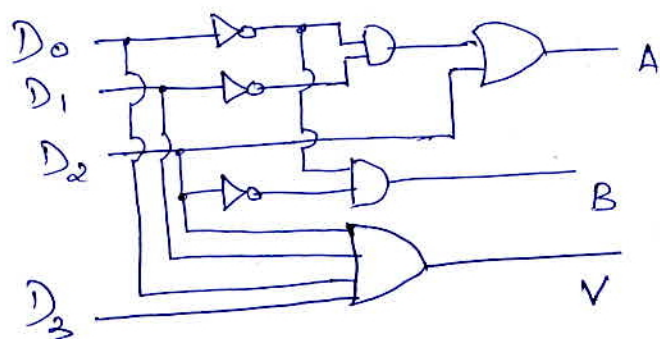
D_2	D_0	D_1	D_3	A	B	V
0	0	0	0	x	x	0
0	0	0	1	1	1	1
0	0	1	x	0	1	1
0	1	x	x	0	0	1
1	x	x	x	1	0	1

from K-map,

$$A = D_2 + \overline{D_0} \overline{D_1} \quad [1]$$

$$B = \overline{D_2} \overline{D_0} \quad [1]$$

$$V = D_0 + D_1 + D_2 + D_3$$



[1]

b) Justification - [1]

5) a) $ABCD = 1001 \rightarrow 1101 \rightarrow 1010101 \rightarrow 111 \rightarrow 1110$

Ans) $E=0, G=1, L=0$

Each stage carries 1 mark.

b) $f(A, B, C) = AB + BC$

Minterms $f = \sum m(1, 3, 7)$

Maxterms $f = \prod M(0, 2, 4, 5, 6)$

6) a)

A	B	C	X	Y	Z
0	0	0	0	0	1
0	0	1	0	1	0
0	1	0	0	0	1
0	1	1	1	0	0
1	0	0	0	1	1
1	0	1	1	1	0
1	1	0	1	0	1
1	1	1	1	1	0

$$X = \sum m(3, 5, 6, 7)$$

$$= BC + AC + AB$$

$$Y = \sum m(1, 4, 5, 7)$$

$$= \overline{B}C + A\overline{B} + AC$$

[1]

$$Z = \sum m(0, 2, 4, 6)$$

$$= \overline{C}$$

Diagram - [1]

b) Justification - [2]