AUTUMN MID-SEM SOLUTION - 2016

Sub : Digital Electronics - EC2009

1) a) i) 858 - 749 →

$$\begin{array}{r} 1000\ 0101\ 1000 \\ -\ 0111\ 0100\ 1001 \\ \hline 0001\ 0000\ 1111 \\ -\ 0110 \\ \hline 0001\ 0000\ 1001 \end{array}$$

(Ans) (0.5)

ii) (-13) - (-6) = -13 + 6

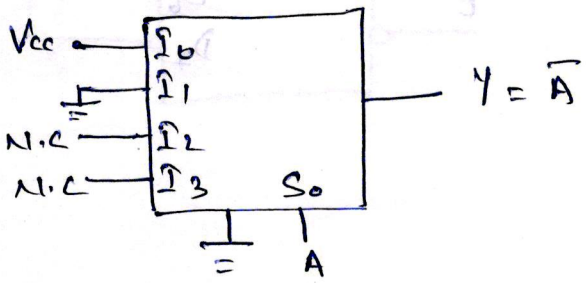
2's complement of -13 = 1111001

ie,

$$\begin{array}{r} 1111\ 0011 \\ 0000\ 1101 \\ \hline 1111\ 1001 \end{array} \xrightarrow{2's} 10000111 \text{ (Ans) (0.5)}$$

b) Gray codes are used in K-maps to ensure that adjacent rows & columns vary only in one bit posⁿ. (1)

c)



(1)

d) 1110110 → $C_1 = 1$, $C_2 = 1$, $C_3 = 0$

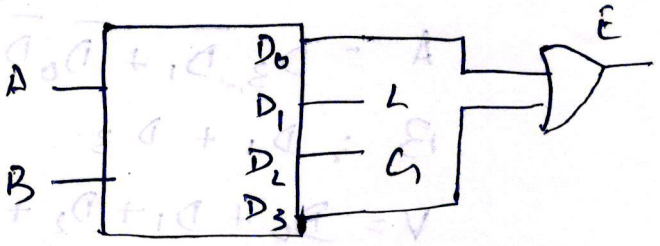
ie, $(011)_2 = 3_{10}$

Correct word is

1100110 → 4 bit data is 0110 (1)

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

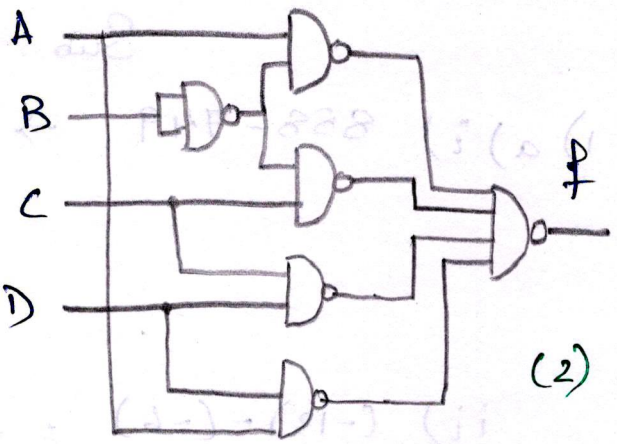


(1)

2)

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

(1)



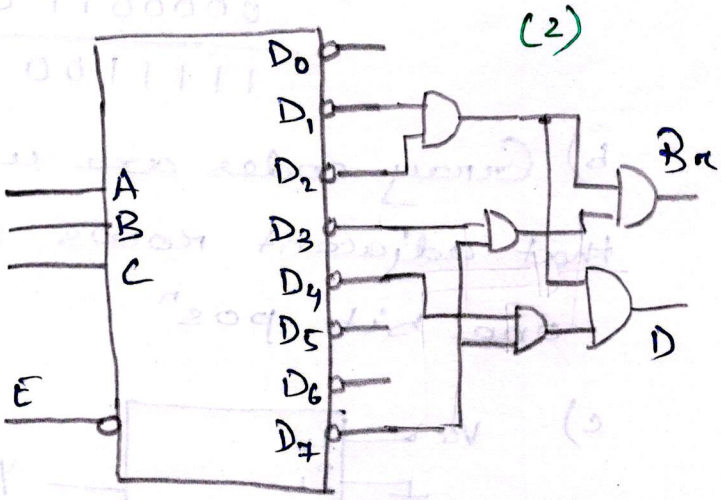
(2)

$f = A\bar{B} + AD + CD + \bar{B}C$ (2)

3)a) Full Subtractore

$D = \Sigma m(1,2,4,7)$

$B_R = \Sigma m(1,2,3,7)$ (1)



(2)

b) $\bar{A}B + A\bar{B}$ (2)

$= A \oplus B$

4)a)

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

(2)

Diagram (1)

$A = D_3\bar{D}_1 + \bar{D}_0\bar{D}_1$ (1)

$B = D_1 + D_3$

$V = D_0 + D_1 + D_2 + D_3$

4) b) Commutative,

A	B	$\overline{AB}$	$\overline{BA}$	$\overline{A+B}$	$\overline{B+A}$
0	0	1	1	1	1
0	1	1	1	0	0
1	0	1	1	0	0
1	1	0	0	1	1

(0.5)

Associative, (0.5)

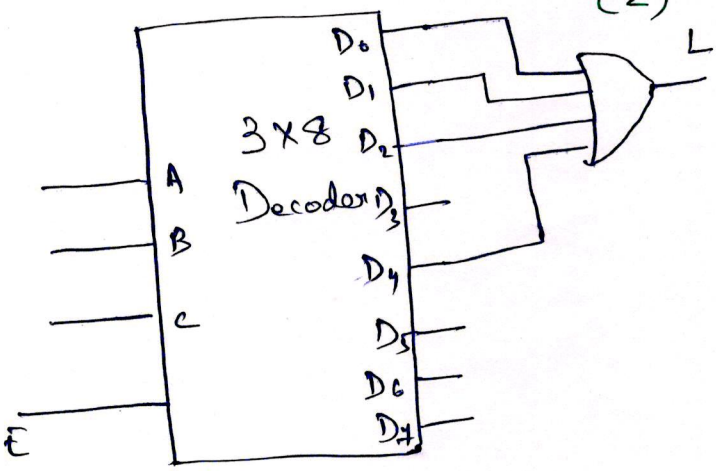
A	B	C	$\overline{A \cdot (\overline{B \cdot C})}$	$\overline{(\overline{A \cdot B}) \cdot C}$	$\overline{A+(\overline{B+C})}$	$\overline{(\overline{A+B})+C}$
0	0	0	1	1	0	0
0	0	1	1	0	1	0
0	1	0	1	1	1	1
0	1	1	1	0	1	0
1	0	0	0	1	0	1
1	0	1	0	0	0	0
1	1	0	0	1	0	1
1	1	1	1	1	0	0

5) a)

A	B	C	L
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

(1)

(2)



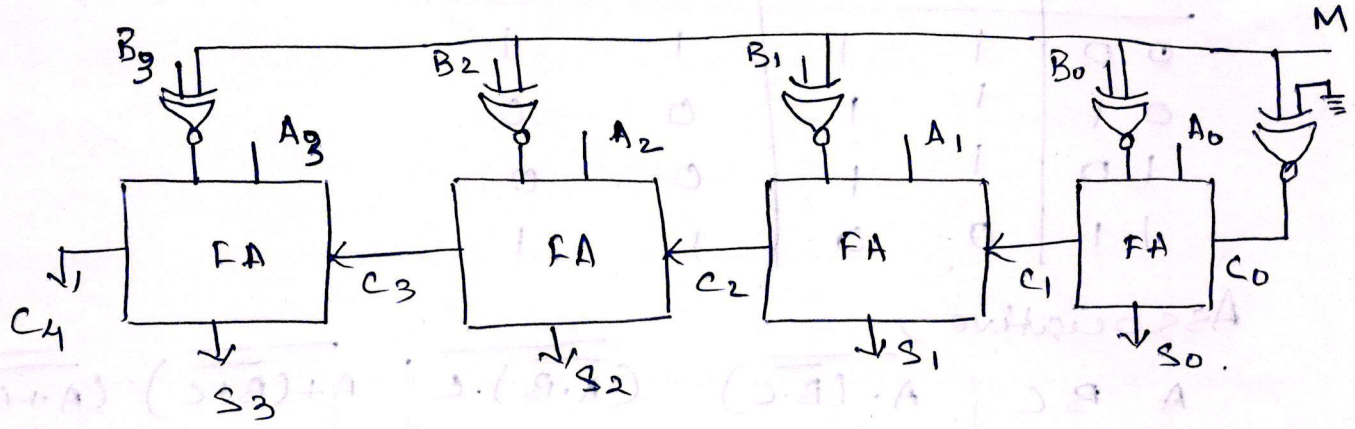
b) $(x + y' + xy)(x + y')(x'y)$ (2)

$= (x + y' + xy)(xx'y + x'yy')$

$= (x + y' + xy) \cdot 0$

$= 0.$

6) a) (2)



Explanation - (1)

b) Definition - (1) (2)

Proof - (1)