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OLOA Assignment

Q1 $(45)_{10}$

→ $(45)_{10} \rightarrow (\ )_2$

2	45	1
2	22	0
2	11	1
2	5	1
2	2	0
	1	1

$\rightarrow (101101)_2$

$(10\ 11\ 01)_2 \rightarrow (\ )_8$

$(\overline{10}\ \overline{101}) \Rightarrow (55)_8$

$(\overline{10}\ \overline{1101}) \rightarrow (\ )_{16}$

$(101101) \rightarrow (2D)_{16}$

Q2a 2s compliment

$(76)_8 - (22)_{16}$

Binary of $(76)_8 \rightarrow (00111110)_2$

Binary of $(22)_{16} \rightarrow (00100010)_2$

2's compliment of $(00100010)_2$

$\rightarrow (11011101)_2$

$+ 1$

$\rightarrow 11011110$

Add

$$\begin{array}{r} 0011\ 1110 \\ 1101\ 1110 \\ \hline 1\ 0001\ 1100 \end{array}$$

∴ carry generated so discard it.

$\therefore$ $0001\ 1100$

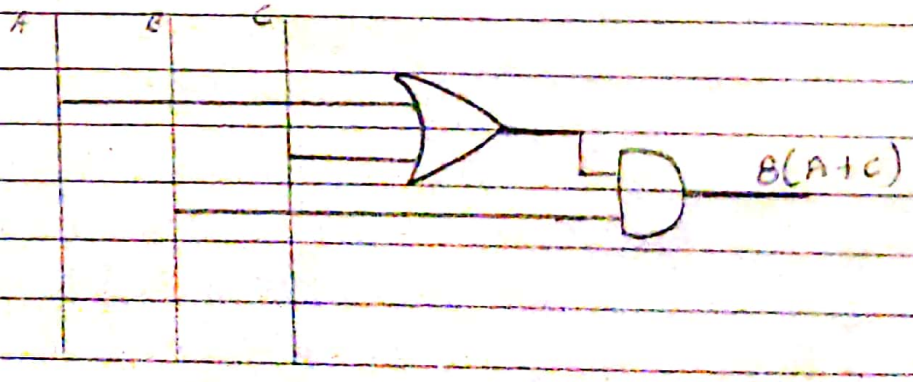
$= (28)_{10}$

Q3a $Y = AB + BC + ABC + ABB$

$= AB(1+B) + BC(1+A)$ $\qquad 1+B = 1$, $1+A = 1$

$= AB + BC$

$= B(A+C)$



Q4 a i)

$Y = AB + BC + ABC + ABB$

$= AB + BC + ABC + AB$

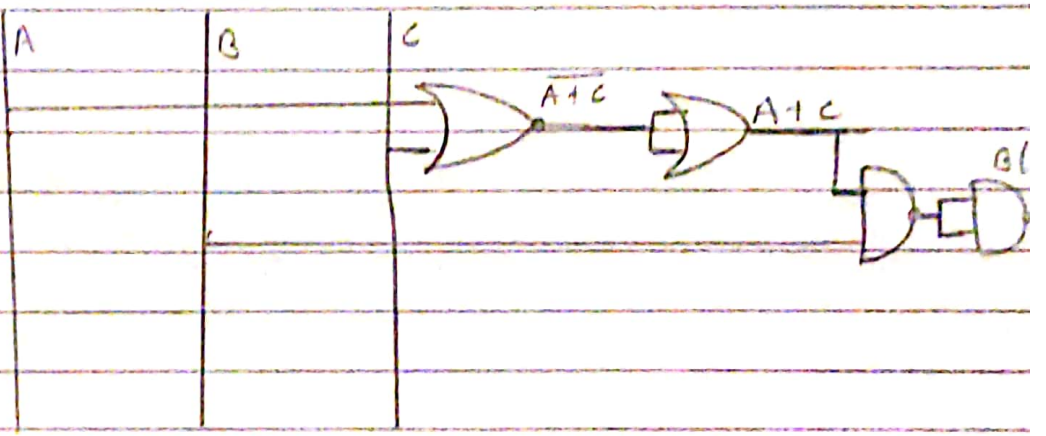
$= AB + BC + ABC$

$= AB + BC(1 + A)$

$= AB + BC$

$= B(A + C)$

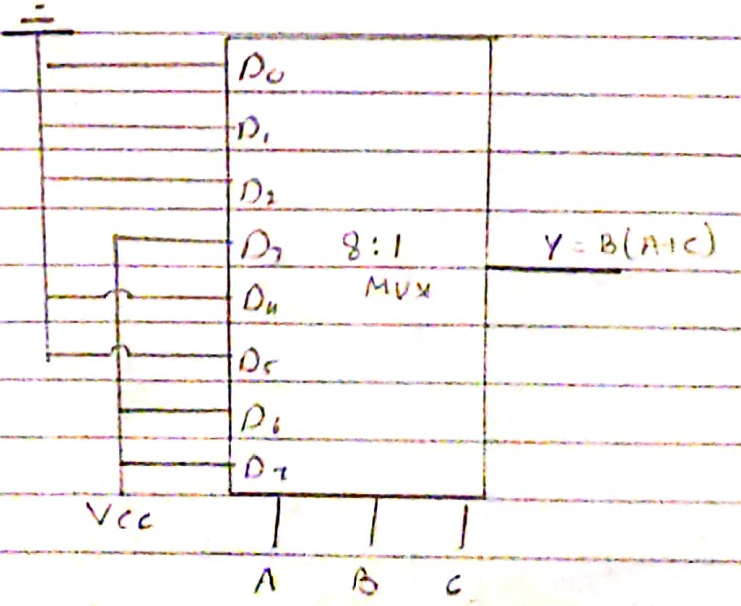
$Y = B(A+C)$



Implementation using universal gates.

ii) $Y = (A + C)B$

A	B	C	Y
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1



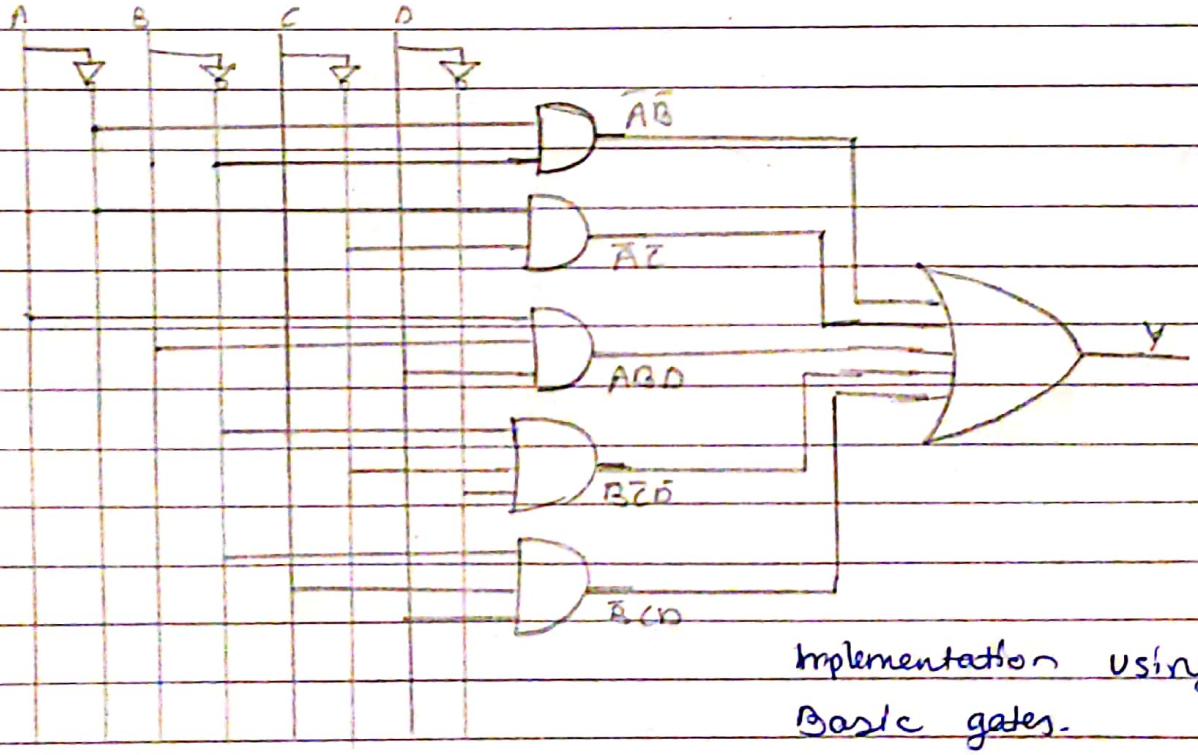
Implementation using multiplexer.

Q5 a) kmaps.

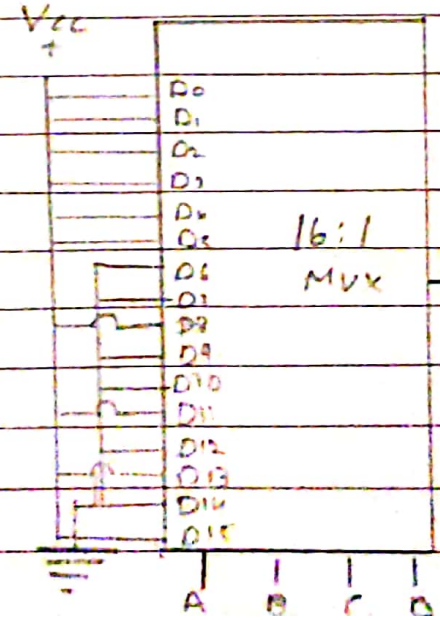
$$Y = \Sigma m\,(0, 1, 2, 3, 4, 5, 8, 11, 13, 15)$$

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

$$\therefore Y = \bar{A}\bar{B} + \bar{A}\bar{C} + ABD + \bar{B}\bar{C}\bar{D} + \bar{B}CD$$



Implementation using Basic gates.



Implementation using Multiplexer.