Assignment - 1

1) Design as 3 input, 1 output digital logic circuit which will take all the octal digits (0, 1, ... 7) as its input product the even parity bit for the corresponding octal digit using kmap, SOP & POS

A	B	C	Digits i		
0	0	0	0	0	Y_0
0	0	1	1	1	Y_1
0	1	0	2	1	Y_2
0	1	1	3	0	Y_3
1	0	0	4	1	Y_4
1	0	1	5	0	Y_5
1	1	0	6	0	Y_6
1	1	1	7	1	Y_7

gray code

A \ BC	00	01	11	10
	0	1	3	2
	0	(1)	0	(1)
	4	5	7	6
	(1)	0	(1)	0

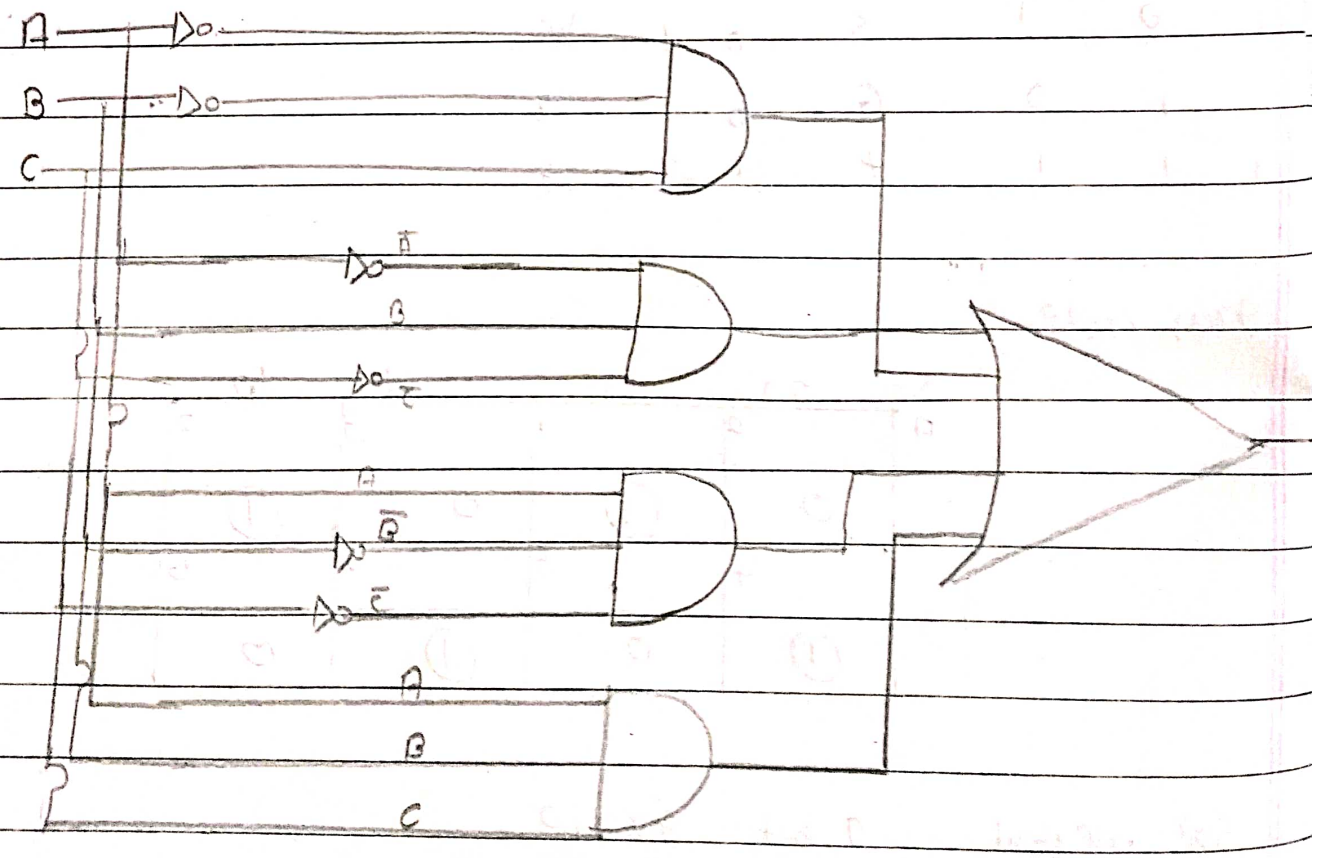
SOP method : 1 bit group.

4 Group

1) G1 = 1
2) G2 = 2
3) G3 = 4
4) G4 = 7

$y = y_1 + y_2 + y_4 + y_7$

$$y = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$$



SOP

* pos method → 0 bit group.

A \ BC	00	01	11	10
	0	1	3	2
	[0]	1	[0]	1
	4	5	7	6
	1	[0]	1	[0]

* Group

$G_{11} = 0$

$G_{12} = 3$

$G_{13} = 5$

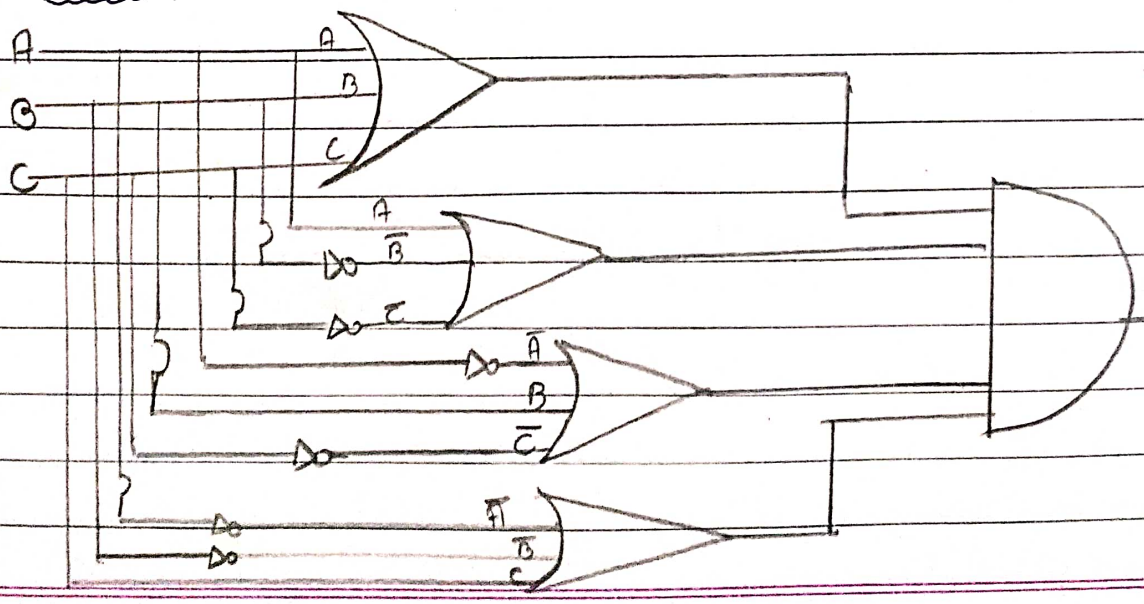
$G_{14} = 6$

~~$y = A+B+C$~~

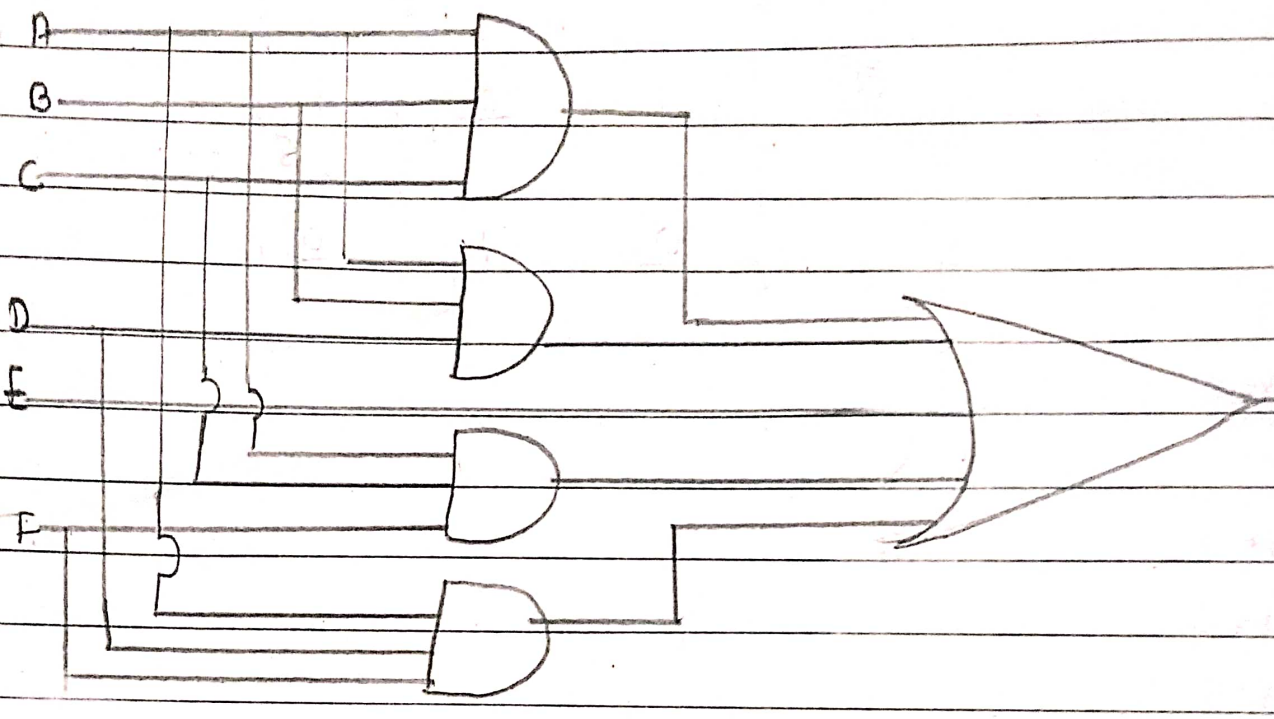
~~$y = y_1 + y_2 + y_3 + y$~~

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

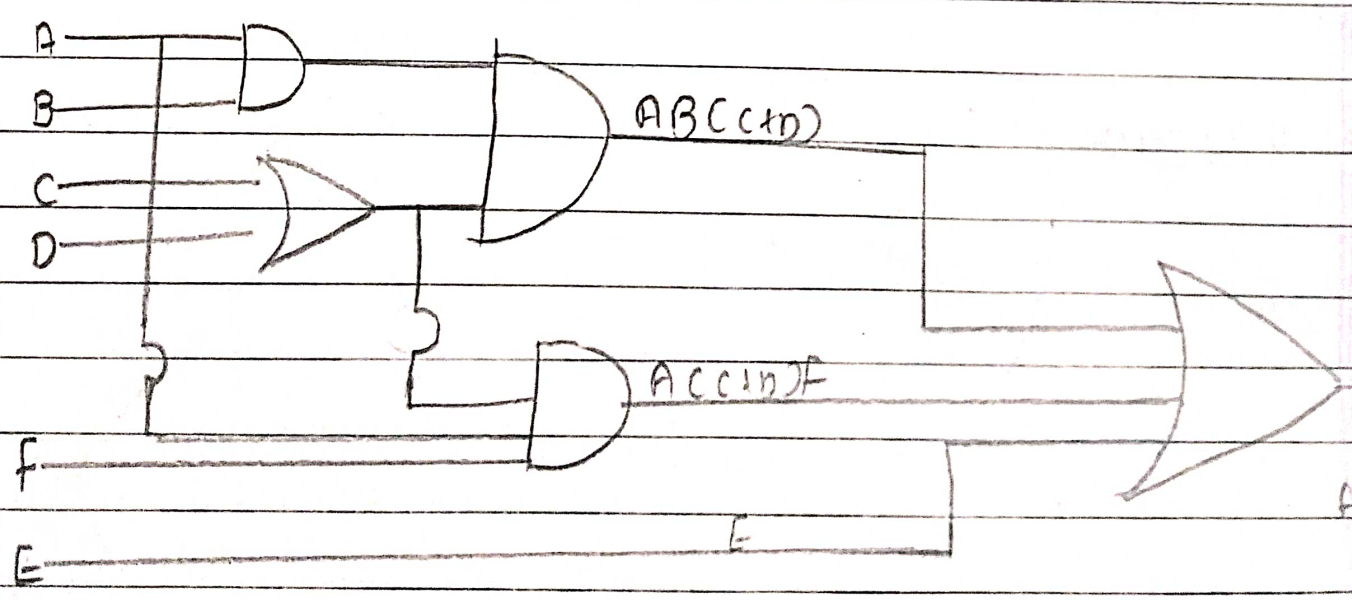
* Diagram



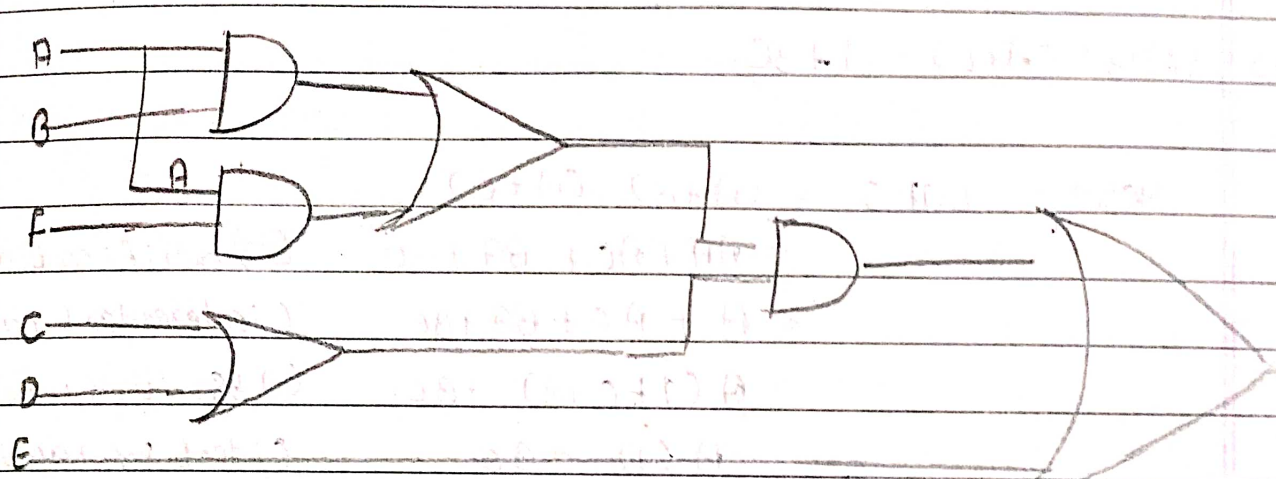
Q-1) $Y = ABC + ABD + E + ACF + ADF$



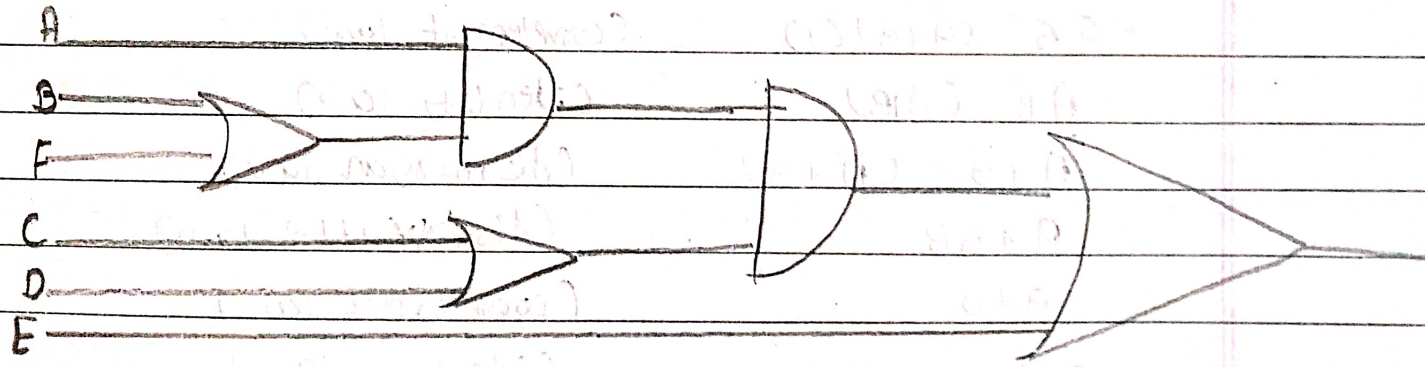
Q-2) $AB(C+D) + E + A(C+D)F$



3) $G_7 = (AB + AF)(C + D) + E$



4) $G_7 = A(B + F)(C + D) + E$



Q-3) Simplifies the Boolean Algebra expression

1) $(A+B)(A+C) = A+BC$

Here L.H.S $= (A+B)(A+C)$

$= AA + AC + BA + BC$ (Simplification)

$= A + AC + BA + BC$ (independent law)

$= A(1+C+B) + BC$ (absorptive law)

$= A(1) + BC$ (identity law)

$= A + BC$

2) $\overline{A}\overline{B}(A+B)(\overline{B}+B)$

$= \overline{A}\overline{B}(\overline{A}+B)(1)$ (complement law)

$= \overline{A}\overline{B}(\overline{A}+B)$ (identity law)

$= (\overline{A}+\overline{B})(\overline{A}+B)$ (de morgan law)

$= \overline{A} + \overline{B}B$ (distributive law)

$= \overline{A} + 0$ (complement law)

$= \overline{A}$ (identity law)