CS220 Assignment-4

1) 3 bit gray code Counter

Gray code Counter is a type of counter in which at a time, only one binary digit changes its value.
Clock is acting as the input signal according to which states will change.

State Assignment

Digit	**Gray Code**	**Assigned State**
0	000	S0
1	001	S1
2	011	S2
3	010	S3
4	110	S4
5	111	S5
6	101	S6
7	100	S7

State Table

Present State			Next state		
Q2	Q1	Q0	Q2	Q1	Q0
0	0	0	0	0	1
0	0	1	0	1	1
0	1	1	0	1	0
0	1	0	1	1	0
1	1	0	1	1	1

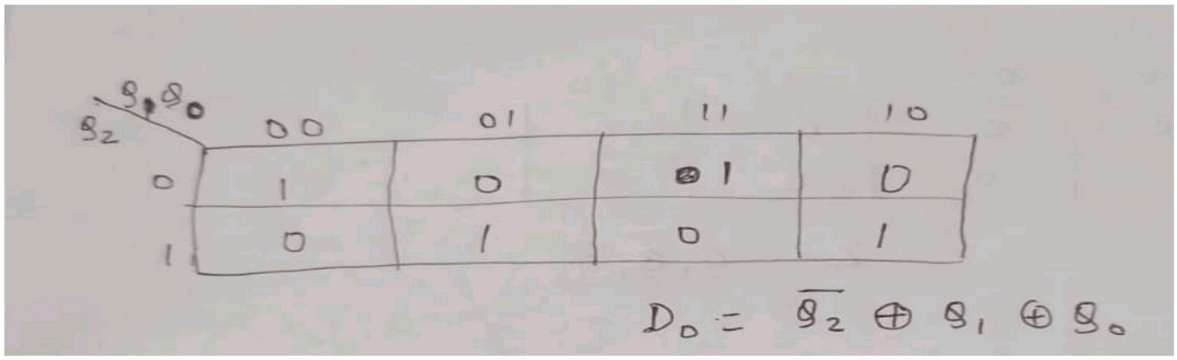
1	1	1	1	0	1
1	0	1	1	0	0
1	0	0	0	0	0

Excitation and Output Table

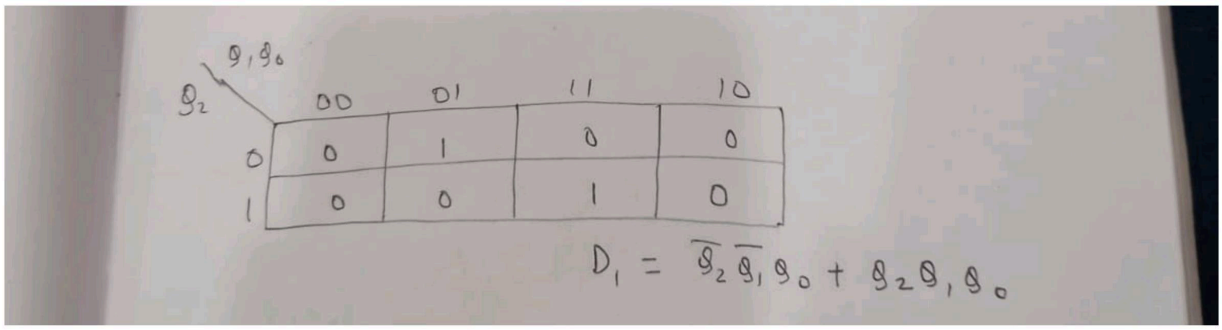
Present State			Next State			Flip Flop Excitations			Output
Q2	Q1	Q0	Q2’	Q1’	Q0’	D2	D1	D0	Z
0	0	0	0	0	1	0	0	1	0
0	0	1	0	1	1	0	1	0	0
0	1	1	0	1	0	0	0	1	0
0	1	0	1	1	0	1	0	0	0
1	1	0	1	1	1	0	0	1	0
1	1	1	1	0	1	0	1	0	0
1	0	1	1	0	0	0	0	1	0
1	0	0	0	0	0	1	0	0	1

- **K maps**

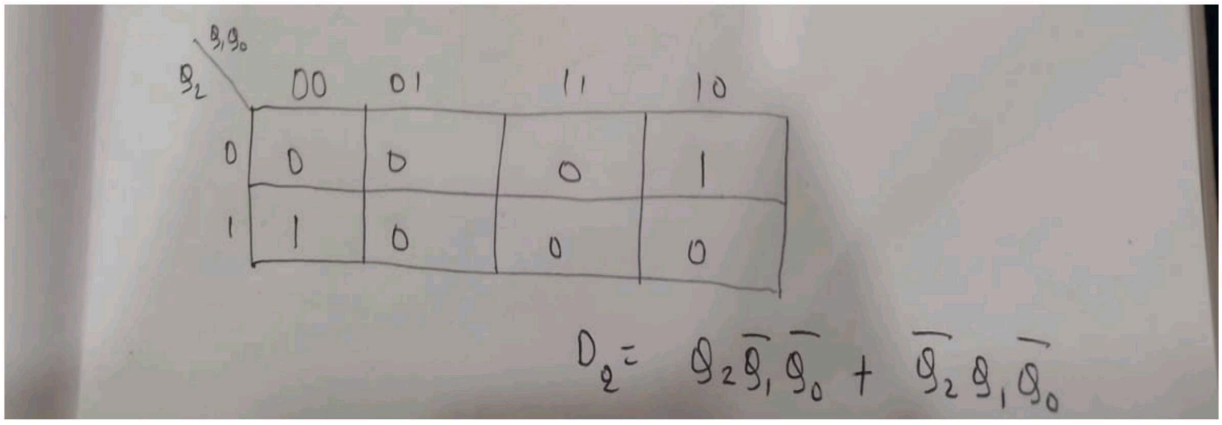
D0



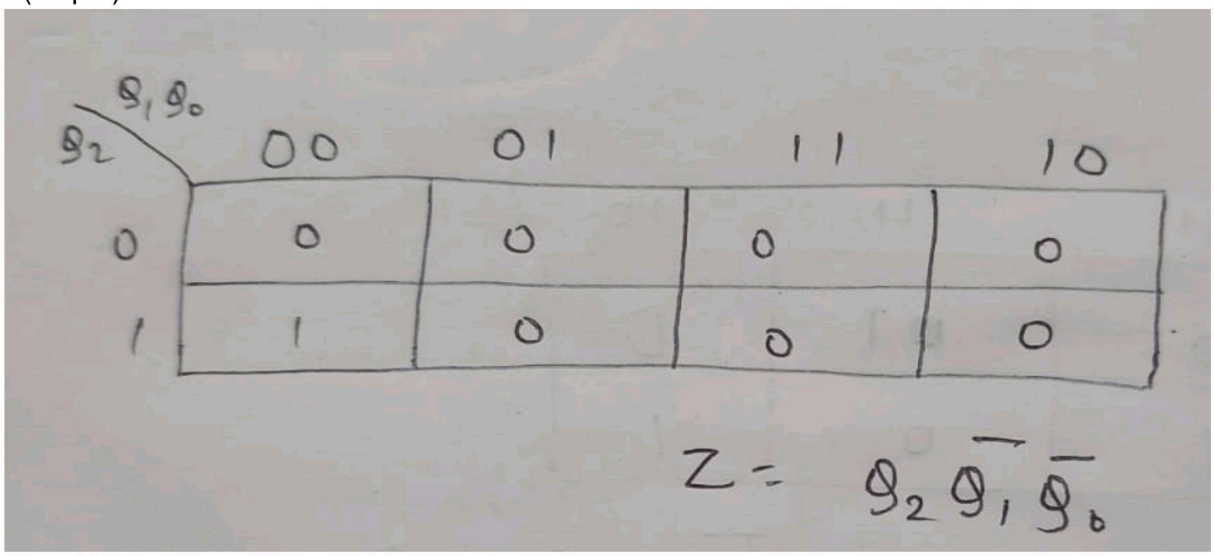
D1



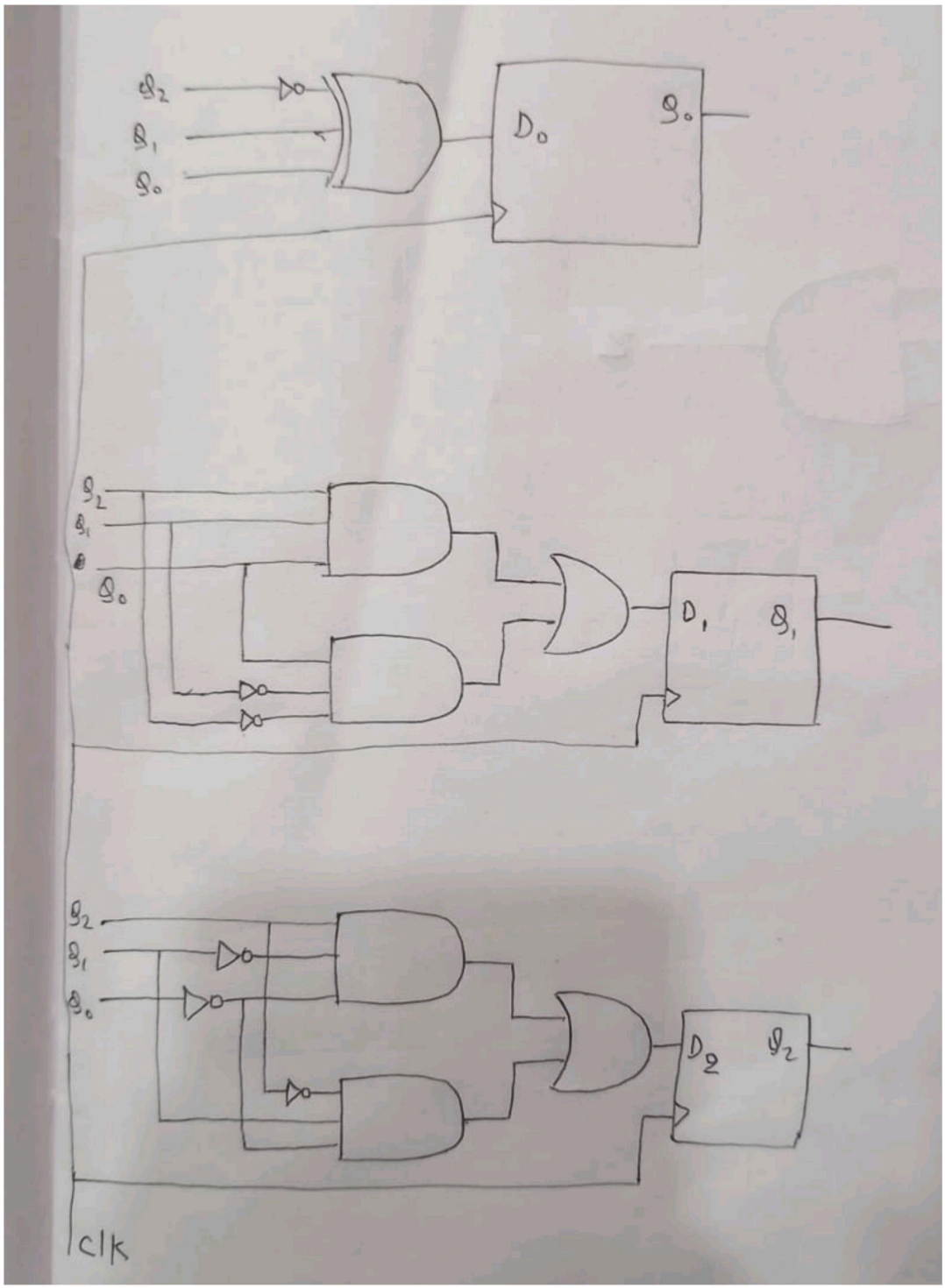
D2

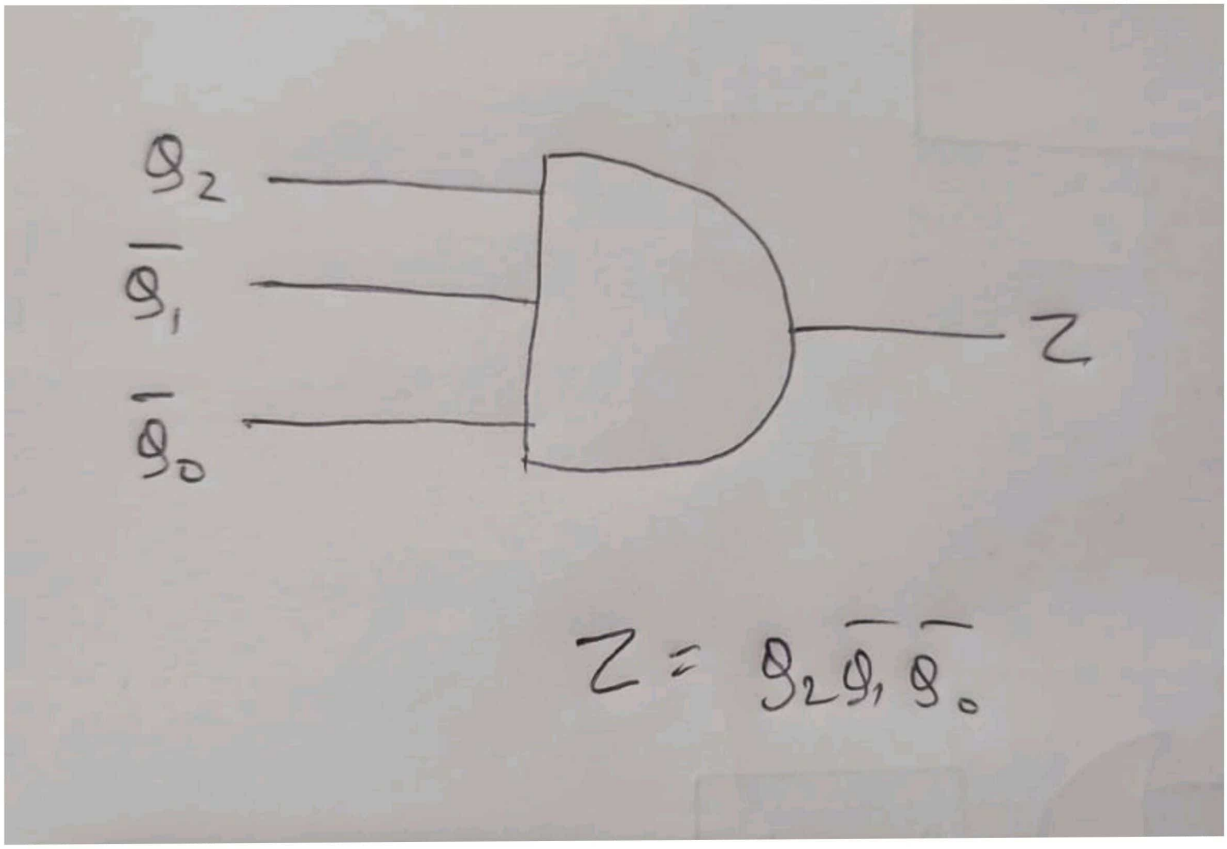


Z(output)



Circuit Diagram


Q_2
Q_1
Q_0
D_0
Q_0
Q_2
Q_1
Q_0
D_1
Q_1
Q_2
Q_1
Q_0
D_2
Q_2
clk



$$Z = q_2 \bar{q}_1 \bar{q}_0$$