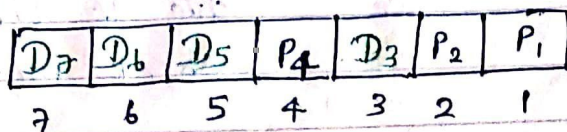


Hamming Code for 4 bit word.

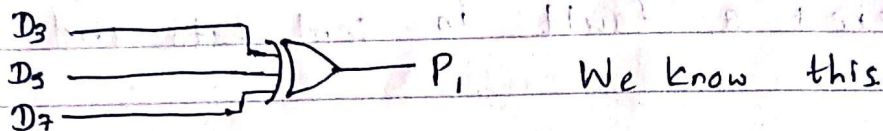
E1171153



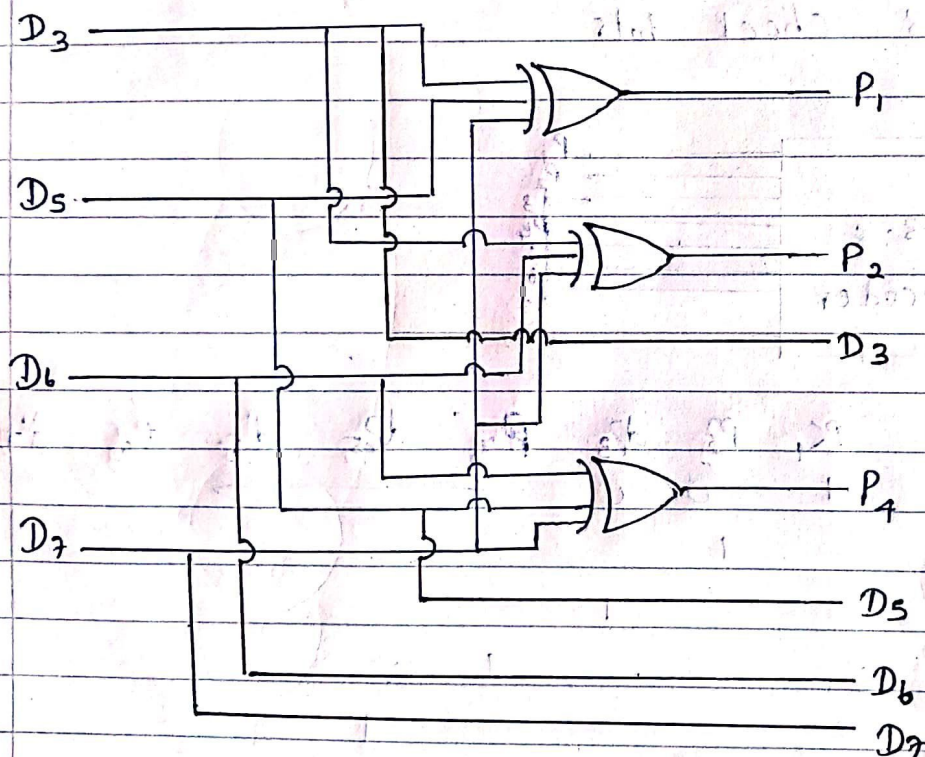
$$P_1 \rightarrow \{3, 5, 7\}$$

$$P_2 \rightarrow \{3, 6, 7\}$$

$$P_3 \rightarrow \{5, 6, 7\}$$

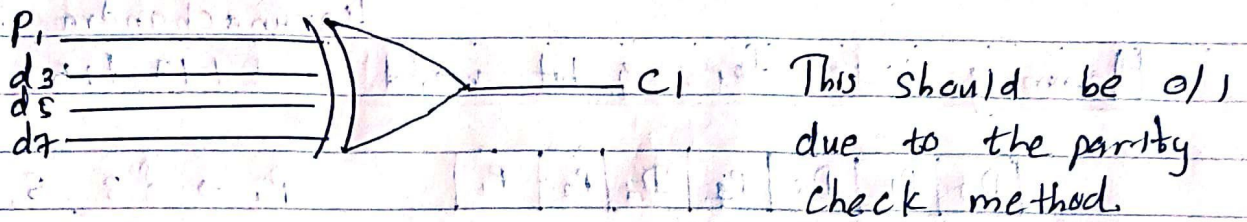


\therefore We can get parity bits as below



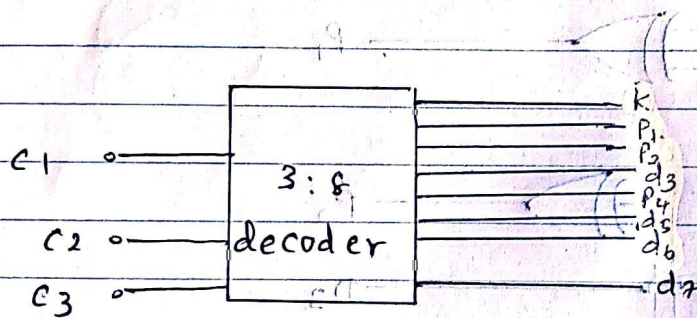
This is the 7-bit hamming code. (Sending circuit)
When this is transferred we can check whether one/more bits are ~~not~~ corrupted or not.

That's done by applying the same theory on previous step.



C_1, C_2, C_3 are found as check bits to checking whether there's a fault in sent bits and recieved ones.

To get to know about what's the exact bit getting interrupted, we can use a 3:8 decoder since there are 3 check bits

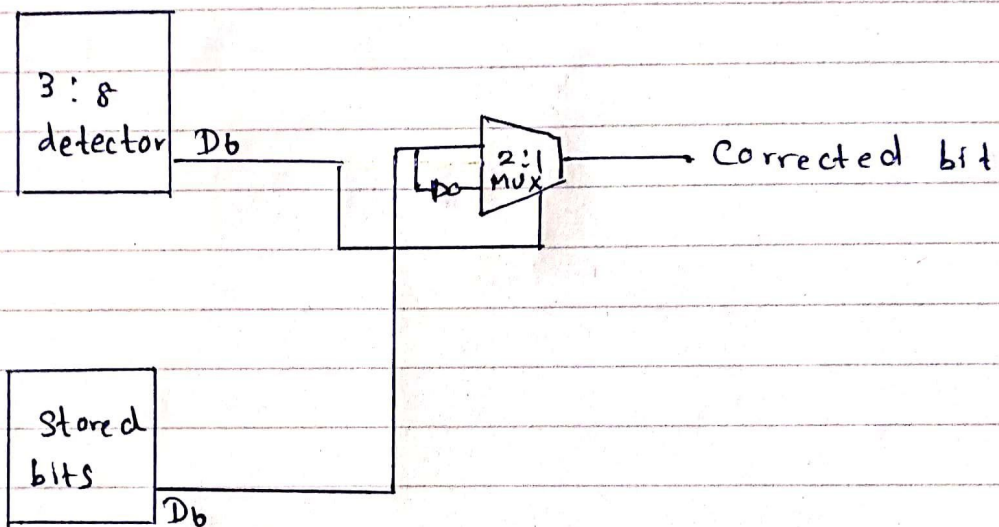


C_1	C_2	C_3	K	P_1	P_2	d_3	P_4	d_5	d_6	d_7
0	0	0	1	0	0					
0	0	1		1						
0	1	0			1					
0	1	1				1				
1	0	0					1			
1	0	1						1		

(The output) also provided the \leftarrow 0 0 0 1

We can send this chosen outputs from decoder to 2:1 Muxes as selectors.

Next we can give inputs to mux from stored 7 bits and there complement for I_0 and I_1 respectively

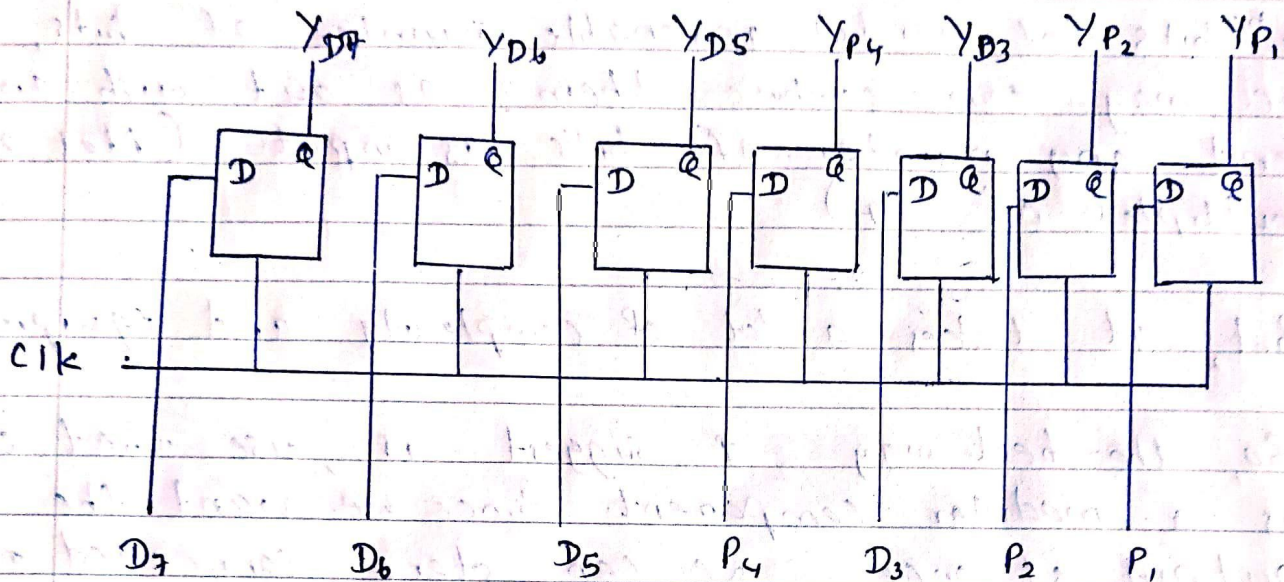


For a 2:1 MUX;

Selector	Out put
0	I_0
1	I_1



Here, register means a parallel input - parallel output register using D Flipflops.



This is the 7 bit register on the circuit. Since it's complex to draw there I just implemented inputs and outputs on the register there.

* How to extend the circuit into n. bits inputs.

Here we have to assume that all the inputs are in form of $4n$. (Number of bits in input word is always a multiple of 4)

If so, we can use that 7 bit hamming code circuit as a modular component and connect specific number of those models and obtain the output.

Otherwise, there's another suggestion such that, if we can make modular components as well as to 1 bit word, 2 bit word, ... like wise for $(2^k \text{ bits of words})$ reasonable number of bits, we may can combine them as out wish and send any number of bits as input. (Not only multiples of 4)

But, it takes a lot of complexity and equipments.

So, the best way I suggest is, use that circuit as a modular component. Since we want the whole output at once, we can store corrected output on a register if needs.

Rather than using $n+k$ bits hamming code, using 7 bit one as a modular component, leads to advantages like low complexity, reducing time delays etc.