CSE 260 LAB Report

Name of Experiment : Design a circuit that outputs 2's complement of a 3 bit number using encoder and decoder

submitted by :

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1. Name of experiment: Design a circuit that outputs 2's complement of a 3 bit number using encoder and decoder.

2. Objective: i) To learn the design and implementation of encoder and decoder.
ii) To implement 2's complement of a 3 bit number using encoder, decoder.

3. Required components and Equipments:

i) IC - 74LS138 (Decoder)
ii) IC - 74LS148 (Encoder)
iii) LOGICSTATE
iv) LOGIC PROBE
v) Power
vi) Ground

4. Experimental setup:

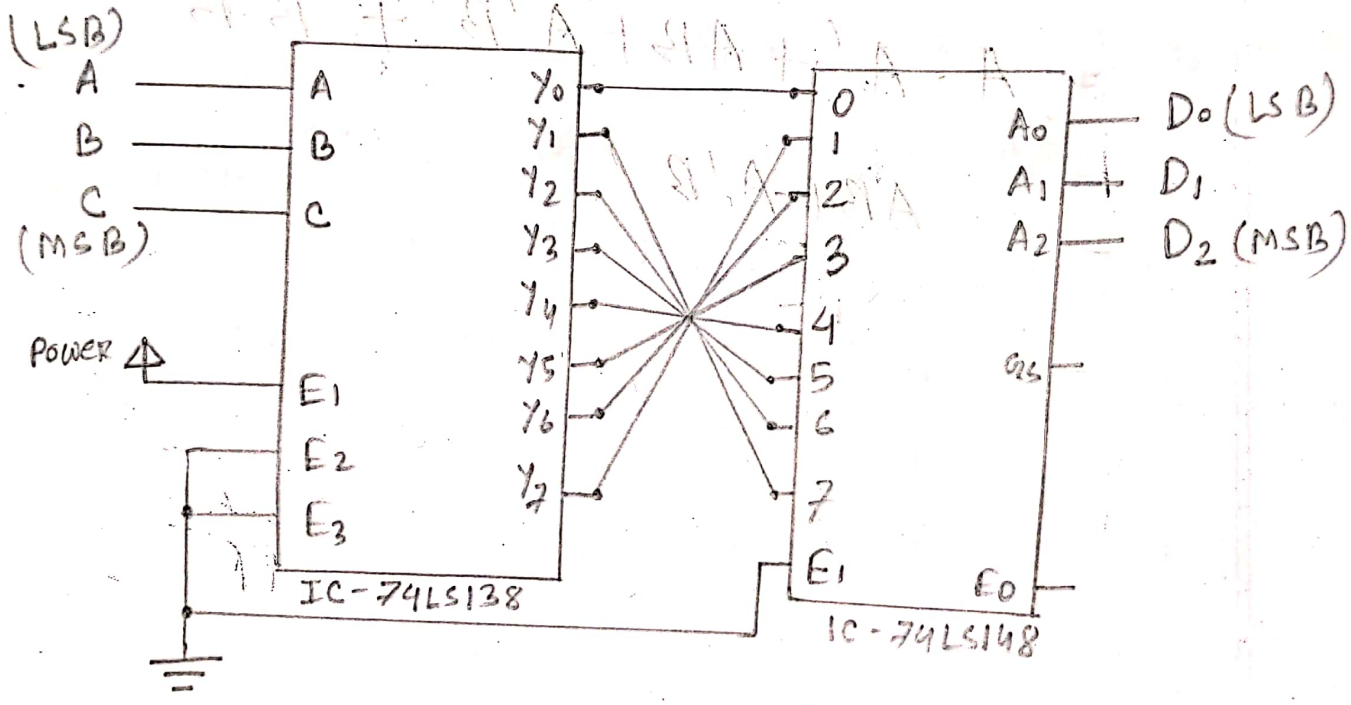

Figure: 2's complement of a 3 bit number using encoder and decoder.

5. Results and Discussions :

The truth table for 2's complement output:

Inputs				Outputs				Active low outputs			Output line connection	
Minterm	C	B	A	Minterm	D_2	D_1	D_0	D_2	D_1	D_0	Decoder	Encoder
0	0	0	0	0	0	0	0	1	1	1	0	0
1	0	0	1	7	1	1	1	0	0	0	1	7
2	0	1	0	6	1	1	0	0	0	1	2	6
3	0	1	1	5	1	0	1	0	1	0	3	5
4	1	0	0	4	1	0	0	0	1	1	4	4
5	1	0	1	3	0	1	1	1	0	0	5	3
6	1	1	0	2	0	1	0	1	0	1	6	2
7	1	1	1	1	0	0	1	1	1	0	7	1

In the circuit diagram, we give 3 inputs as 3 bit binary number through IC-74LS138 decoder to get 8 outputs. As decoder gives on value on the minterm th pin of the output and our encoder having 8 inputs which it converts into its on pin numbers binary, we give the on outputs from decoder to the inputs of our first

inputs of 2's complement numbers decimal pin of encoder. After that we will get the complement result of our 2's complement as it is an active low IC. so that output provides our 2's complement

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Truth table for 1's complement of 3 bit number using encoder, decoder:

Inputs				Outputs				Active low output			output line connection	
min	C	B	A	min	D_2	D_1	D_0	D_2	D_1	D_0	Decoder	Encoder
0	0	0	0	7	1	1	1	0	0	0	0	7
1	0	0	1	6	1	1	0	0	0	1	1	6
2	0	1	0	5	1	0	1	0	1	0	2	5
3	0	1	1	4	1	0	0	0	1	1	3	4
4	1	0	0	3	0	1	1	1	0	0	4	3
5	1	0	1	2	0	1	0	1	0	1	5	2
6	1	1	0	1	0	0	1	1	1	0	6	1
7	1	1	1	0	0	0	0	1	1	1	7	0

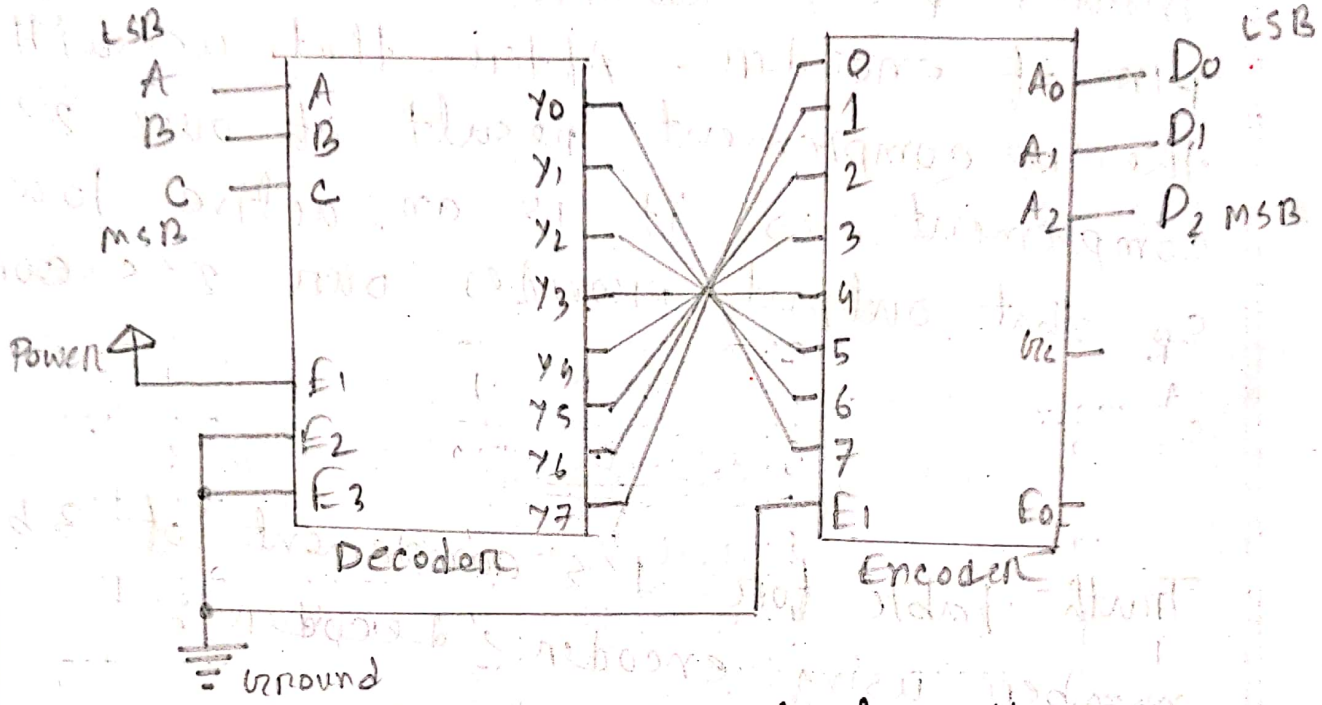

Figure: 1's complement output w diagram using 3 bit binary input using encoder, decoder.

The above figure takes 3 inputs in the decoder then as the decoder gives on to inputs minterm pin, that pin is being connected to inputs 1's complement decimal pin in the encoder which provides that pins binary value in the active low that means it gives the actual 1's complement of our first input.

(b) Yes, I can implement a code converter with encoder and decoder. Below is given a circuit diagram for BCD to Excess 3 code converter:

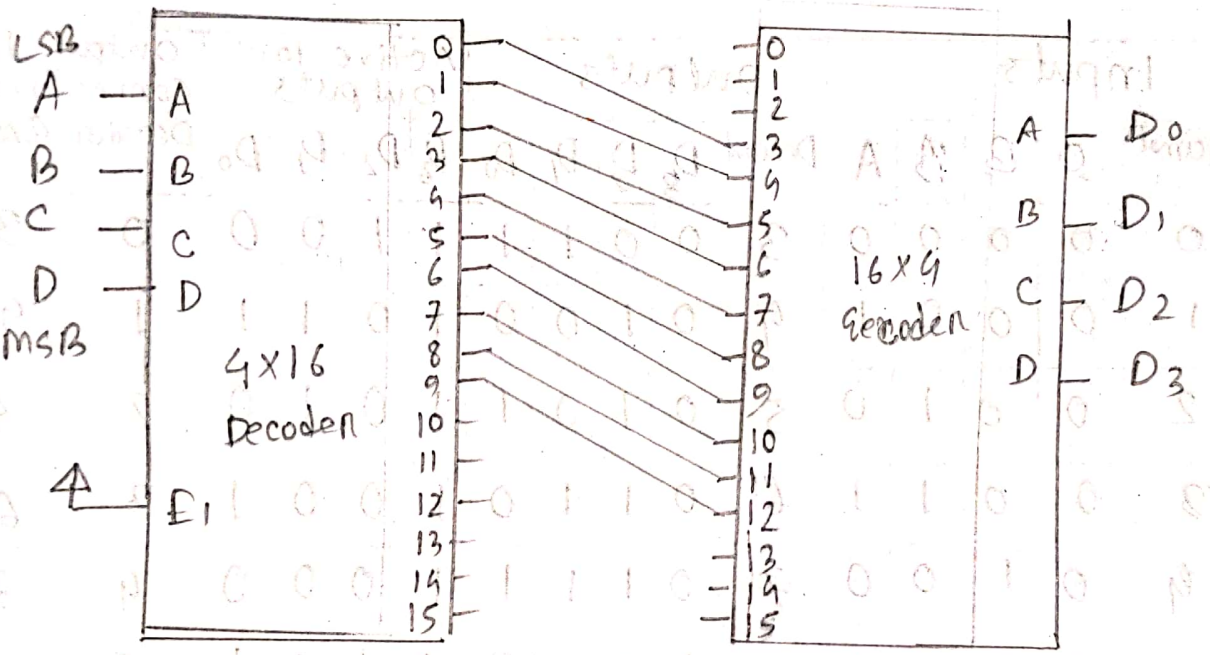

Figure: BCD to Excess 3 converter.

In BCD to Excess 3 convertion, BCD+3 = Excess-3. So In this diagram when active input goes through a decoder it turns its decimal pin active. Then we connect that pin to the pin in encoder which we get by adding 3 with decoder active output. Then encoder returns that active inputs

Excess three value in active low. Here's how our BCD to excess-3 code converter works.

BCD to Excess-3 truth table is given below:

Inputs					Outputs					Active low outputs				Output line connection	
Decimal	D	C	B	A	Decimal	D_3	D_2	D_1	D_0	D_3	D_2	D_1	D_0	Decoder	Encoder
0	0	0	0	0	3	0	0	1	1	1	1	0	0	0	3
1	0	0	0	1	4	0	1	0	0	1	0	1	1	1	4
2	0	0	1	0	5	0	1	0	1	1	0	1	0	2	5
3	0	0	1	1	6	0	1	1	0	1	0	0	1	3	6
4	0	1	0	0	7	0	1	1	1	1	0	0	0	4	7
5	0	1	0	1	8	1	0	0	0	0	1	1	1	5	8
6	0	1	1	0	9	1	0	0	1	0	1	1	0	6	9
7	0	1	1	1	10	1	0	1	0	0	1	0	1	7	10
8	1	0	0	0	11	1	0	1	1	0	1	0	0	8	11
9	1	0	0	1	12	1	1	0	0	0	0	1	1	9	12