Department of Computer Science and Engineering
BRAC University
CSE 260: Digital Logic Design

Experiment # 6: Design circuit using encoder & decoder.

Objective:

- To get familiarized with ***74ls138 [decoder]; 74ls148 [encoder]***
- To gain experience working with practical circuits.

Required Components:

1. IC 74138
2. IC 74148

Theory:

Enable Pin: An enable pin is a special input in a digital circuit that works like an ON/OFF switch. It controls whether the circuit or a part of it is active or inactive.

Active Low Circuit: Active-low means the circuit turns on or performs its function when the input is 0 (low voltage).
For example, if an enable pin is active-low, it means you must give a 0 (low voltage) to turn the circuit ON.

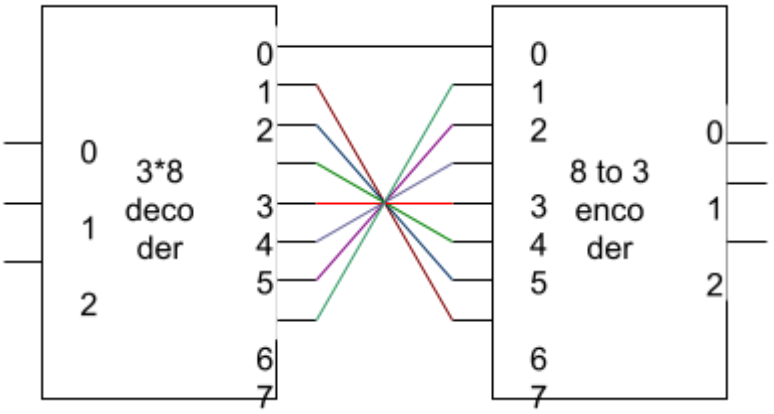
Task - 1: Design a circuit that outputs the 2's complement of a 3-bit number using encoder & decoder.

Truth Table:

Inputs				Expected Outputs				Active Low Outputs		
Minterm	C	B	A	Minterm	D_2	D_1	D_0	D2	D1	D0
0	0	0	0	0	0	0	0	1	1	1
1	0	0	1	7	1	1	1	0	0	0
2	0	1	0	6	1	1	0	0	0	1
3	0	1	1	5	1	0	1	0	1	0
4	1	0	0	4	1	0	0	0	1	1
5	1	0	1	3	0	1	1	1	0	0
6	1	1	0	2	0	1	0	1	0	1
7	1	1	1	1	0	0	1	1	1	0

Diagram:

Building a 3-bit 2's complement converter using encoder and decoder:



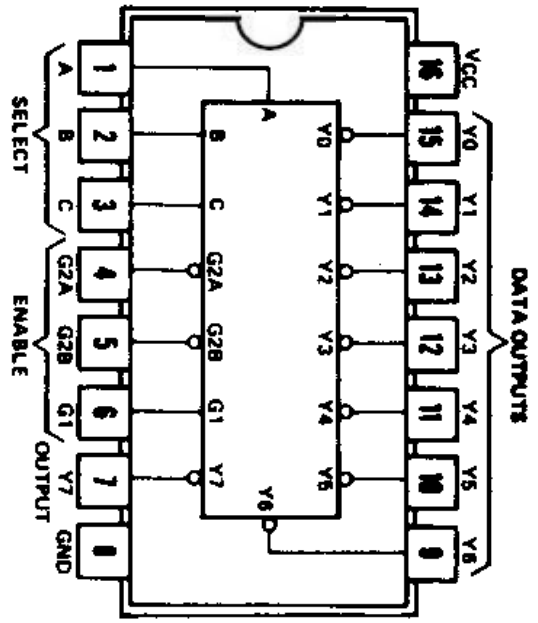
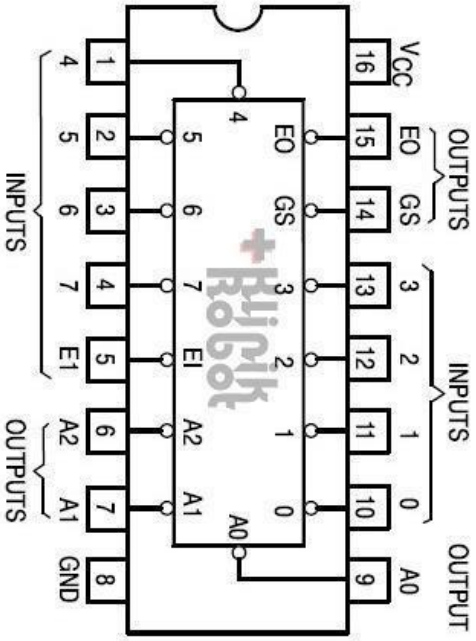
Output line Connection	
Decoder	Encoder
0	0
1	7
2	6
3	5
4	4
5	3
6	2
7	1

Procedure:

- Construct the Circuit Diagram on the breadboard.
- Remember to connect each IC's VCC pin to the "+5V" position of the DC Power Supply of the trainer board, and the GND or 0V pin to the "GND" position of the trainer board.
- Connect the inputs to the Data switches and outputs to any position of the LED Display.

Pin Diagrams of 74138 [decoder] and 74148 [encoder] ICs:

74138



74148