EEE-1212:Digital Logic Design Lab

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Experiment Number: 10

Name of the Experiment:
Design and construction of a 4 to 2 bit encoder

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Experiment Name:

Design and construction of a 4 to 2 bit encoder

Objectives:

The objectives of this lab is to understand the internal circuity of 4 to 2 bit encoder and implement 4 to 2 bit encoder circuit and testing the encoder circuit by comparing with truth table.

Theory:

The opposite of this decoding process is called encoding and is performed by a logic circuit called an encoder. An encoder has a number of input lines, only one of which is activated at a given time, and produces an *N*-bit output code, depending on which input is activated. If a encoder has 2^N input lines then we can say it has N output lines.

We saw that a binary-to-octal decoder (3-line-to-8-line decoder) accepts a three-bit input code and activates one of eight output lines corresponding to that code. An octal-to-binary encoder (8-line-to-3-line encoder) performs the opposite function: it accepts eight input lines and produces a three-bit output code corresponding to the activated input. Similarly a 4 line to 2 line decoder accepts four bit input code and produces a two-bit output code corresponding to the activated input.

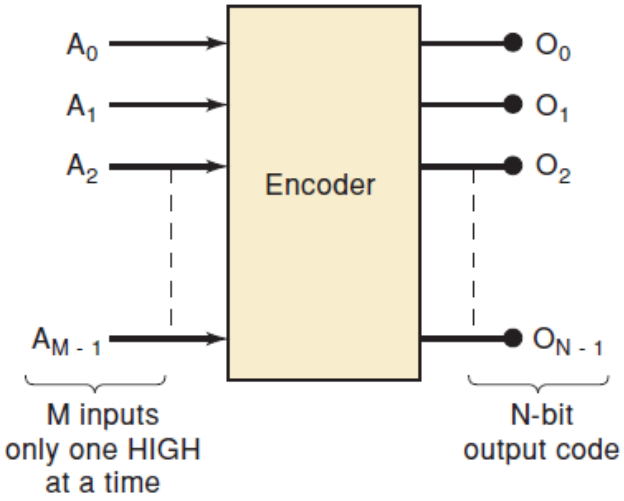

Fig: General Encoder Diagram

Instruments:

i) A trainer board
ii) 3 IC(s) IC-7486, IC-7408 ,IC- 7400
iii) Connecting wires

Procedure:

i) At first we placed the integrated circuit with IC-7408 ,IC-7486 and IC-7400 on a breadboard properly. This IC(s) are placed across the gap in the center of the breadboard .
ii) Then we connected the inputs to the IC- 7408 logic with the logic sources and its output from IC-7408 to the logic indicator.
iii) Gave biasing to the ICs with the VCC(5 volt) and GND(0 volt), and do necessary connections according to the circuit diagram .
iv) For various input combinations we observe the output for each one is applied .
v) The output of the circuit will be shown on the LED. (LED Off = 0, LED On = 1).

Result:

Input				Output	
I_3	I_2	I_1	I_0	O_1	O_0
0	0	0	1	0	0
0	0	1	0	0	1
0	1	0	0	1	0
1	0	0	0	1	1

$O_1 = \overline{I_3}\ I_2\ \overline{I_1}\ \overline{I_0} + I_3\ \overline{I_2}\ \overline{I_1}\ \overline{I_0}$
$= \overline{I_1}\ \overline{I_0}\ (\overline{I_3}\ I_2 + I_3\ \overline{I_2}\ )$
$= \overline{I_1}\ \overline{I_0}\ (\quad I_3 \oplus I_2\ )$

$O_0 = \overline{I_3}\ \overline{I_2}\ I_1\ \overline{I_0} + I_3\ \overline{I_2}\ \overline{I_1}\ \overline{I_0}$
$= \overline{I_2}\ \overline{I_0}\ (\overline{I_3}\ I_1 + I_3\ \overline{I_1}\ )$
$= \overline{I_1}\ \overline{I_0}\ (\quad I_3 \oplus I_1\ )$

Discussion:

In this experiment we have to implement 4 line to 2 line encoders . But we faced some problems when we do this experiment.

i) At first we started work with IC-7400 in place of IC-7486. So we didn't get proper output for a long time. We didn't understand what mistakes we have done. Then we check the IC no after a long time started our work perfectly.

ii) In this experiment we have to use 3 IC(s) at the same time . So we need too many IC(s) wires to connect the IC(s) among themselves.

But we figured them out and completed our experiment successfully.