



LAB REPORT

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Section : **A**
Semester : **1-2**
Experiment No : **10**



Experiment: Decoders.

AIM:

- To realize a decoder circuit using basic gates.
- To design a full adder using decoder.

Learning Objectives:

- To learn about working principle of decoder.
- To learn about the application of decoder.

iii) To learn implementing 3 to 8 decoder.

Theory:

A decoder is a combinational circuit that connects the binary information from 'n' input lines to a maximum of 2^n unique output lines. Decoder is also called a min-term generator / minterm generator.

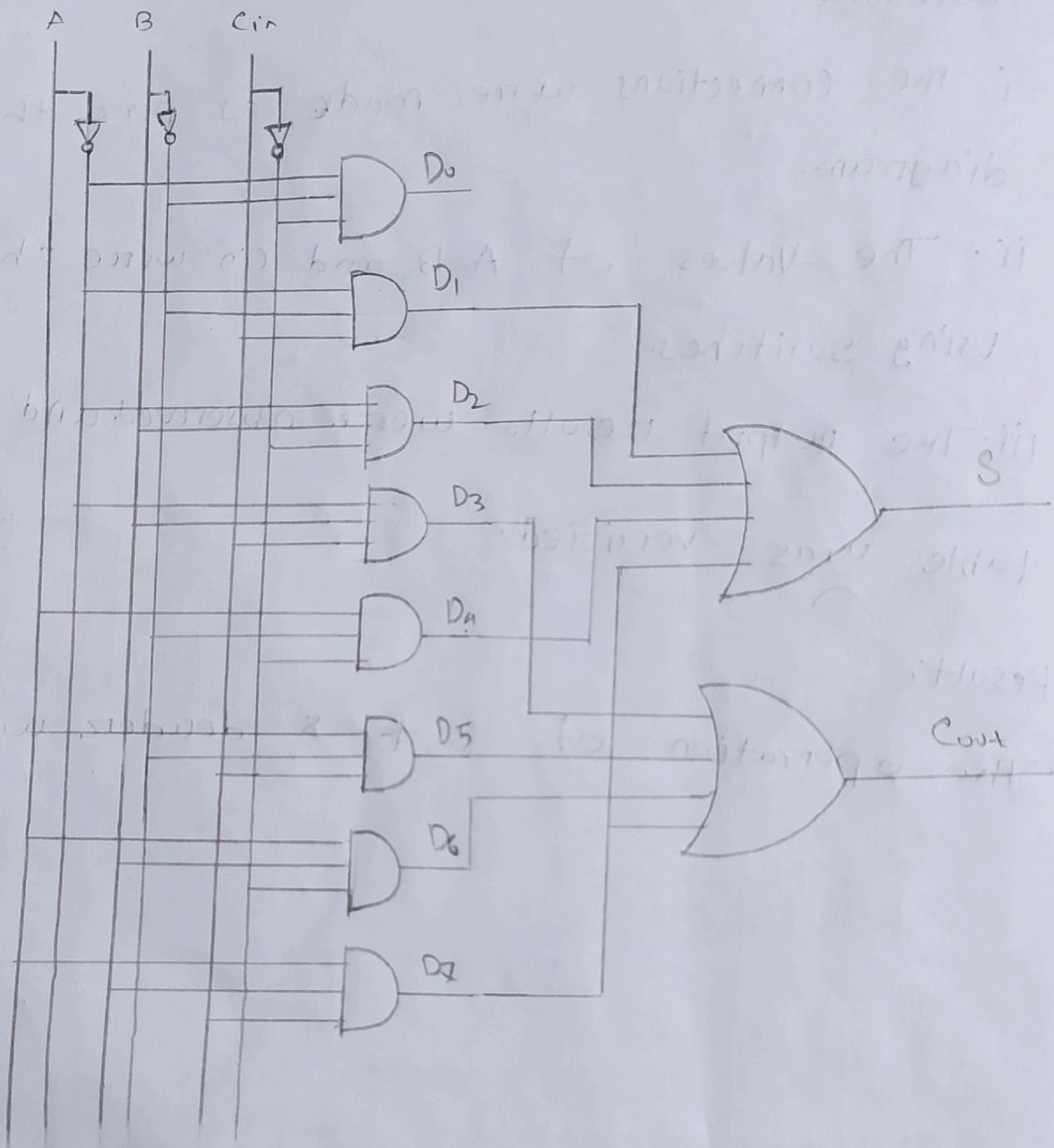
A minterm generator is constructed using AND and NOT gates. The appropriate output is indicated by logic 1 (positive logic). Minterm is constructed using NAND gates. The appropriate output is indicated by logic 0 (negative logic).

Truth table for full adder:

A	B	Cin	D ₀	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	S	Cout
0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	1	0	1	0	0	0	0	0	0	1	0
0	1	0	0	0	1	0	0	0	0	0	1	0
0	1	1	0	0	0	1	0	0	0	0	0	1
1	0	0	0	0	0	0	1	0	0	0	1	0
1	0	1	0	0	0	0	0	1	0	0	0	1
1	1	0	0	0	0	0	0	0	0	1	0	1
1	1	1	0	0	0	0	0	0	0	0	1	1

Hence, $S = D_1 + D_2 + D_4 + D_7$. $C_{out} = D_3 + D_5 + D_6 + D_7$

Components Required: IC 7404, IC 7408, IC 7432, patch cords and trainer kit.



Procedure:

- i. The connections were made as per the circuit diagram.
- ii. The values of A, B and cin were changed using switches.
- iii. The output results were observed and the truth table was verified.

Result:

The operation of 3 to 8 decoder was verified

Viba Question:

Q. What are the applications of decoder?

Ans.

- ① These are used in analog to digital conversion in analog decoders.
- ② To convert instructions into CPU we use decoder.
- ③ Mainly these are used in logical circuits and for data transferring.

Q. What is the difference between decoder and encoder?

Ans:

Encoders convert digital data into binary data. On the other hand, decoders convert binary data into digital data.

Q. For $n=2^n$ decoder how i/p lines & how many o/p lines are found?

Ans:

$$\text{input lines} = n \therefore \text{output lines} = 2^n$$

a. What is the difference between decoder and demux?

Ans:

A demux is a circuit that passes the input to several output depending on selection line.

A decoder is a circuit that converts the input signals or decode the signals.