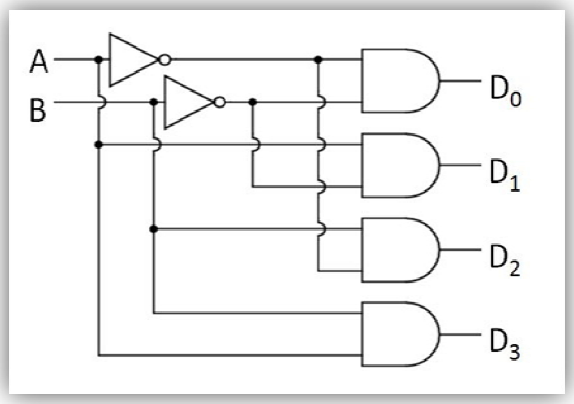
Course Name: A Level (1st Sem) **Subject: CO**

Topic: Decoder **Date: 25-03-20**

Decoders: Decoders are another type of Digital Logic device that have inputs of 2-bit, 3-bit or 4-bit codes depending upon the number of data input lines, so a decoder that has a set of two or more bits will be defined as having an n-bit code, and therefore it will be possible to represent 2^n possible values. Thus, a decoder is a circuit that can decode a total of (2^n) different possible values in an (n) bit code.

A 2 to 4 line Decoder: In this circuit the two input lines can be set to any one of four binary values, 00, 01, 10 or 11. Resulting from this input, the output line corresponding to the binary value at inputs A and B, changes to logic 1. The other output lines remain at logic 0.



Circuit Diagram

A	B	D_0	D_1	D_2	D_3
0	0	1	0	0	0
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	1

Truth Table

Here we see that when A,B are 0,0 - D_0 is 1; when A,B are 0,1 - D_1 is 1; when A,B are 1,0 - D_2 is 1; and when A,B are 1,1 - D_3 is 1;

Boolean Expressions for a 2 to 4 Decoder:

$D_0 = A'B'$ $D_1 = A\,B'$

$D_2 = A'\,B$ $D_3 = A\,B$

Exercise:

1. What is a decoder? How does it work?
2. Design a 3 to 8 line decoder along with its Truth Table.