

Day 3

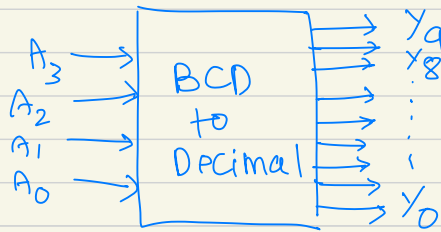
3<sup>rd</sup> Sept / 4<sup>th</sup> Sept.

Encoder converts the binary inputs to unique binary codes.

1) (a) BCD to decimal encoder.

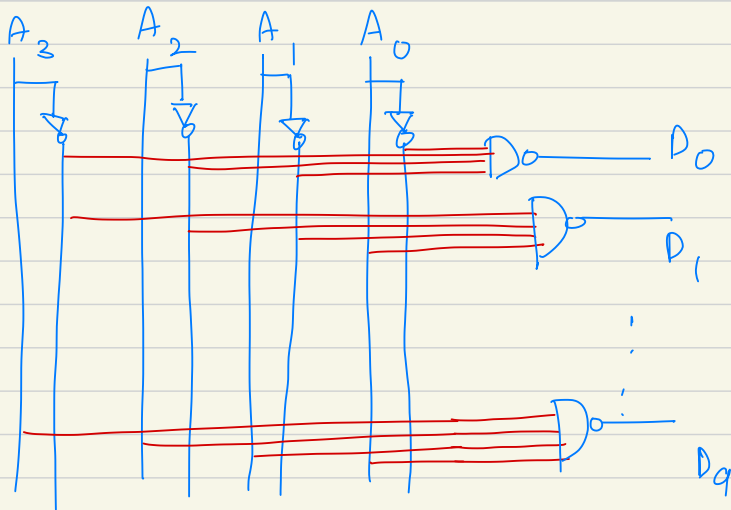
Decimal digits are from 0 to 9; whereas decimal numbers are all the numbers like 10, 11, ....

So in order to convert BCD to decimal encoder we need 4 bits. ( $\because$  0-9 can be represented w/ 4 digits)



BCD				to				decimal			
A <sub>3</sub>	A <sub>2</sub>	A <sub>1</sub>	A <sub>0</sub>	D <sub>9</sub>	D <sub>8</sub>	D <sub>7</sub>	D <sub>6</sub>	D <sub>5</sub>	D <sub>4</sub>	D <sub>3</sub>	D <sub>2</sub>
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	1
0	0	1	0	0	0	0	1	1	1	1	1
0	0	1	1	0	0	0	1	0	0	1	0
...	...	...	...	...	...	...	...	...	...	...	...
1	0	0	1	1	0	0	1	1	1	1	1

equations for  $A_3, A_2, A_1, \& A_0$



don't care from  
10, 11, ..., 15

	00	01	11	10
00	$D_{00}$	1	3	2
01	4	5	7	6
11	X <sub>8</sub>	X <sub>9</sub>	X <sub>11</sub>	X <sub>10</sub>
10	12	13	X <sub>15</sub>	X <sub>14</sub>

	00	01	11	10
00	0	$D_1$ 1	3	2
01	4	5	7	6
11	X 8	X 9	X 11	X 10
10	12	13	X 15	X 14

	00	01	11	10
00	0	1	3	$D_2$ 2
01	4	5	7	6
11	X 8	X 9	X 11	X 10
10	12	13	X 15	X 14

Similarly  
all would  
be like this  
& combining all  
in 1 k-map

	00	01	11	10
00	$D_{00}$ 0	$D_1$ 1	$D_3$ 3	$D_2$ 2
01	$D_4$ 4	$D_5$ 5	$D_7$ 7	$D_6$ 6
11	X 8	X 9	X 11	X 10
10	$D_8$ 12	$D_9$ 13	X 15	X 14

On simplifying

$$D_0 = \bar{A}_3 \cdot \bar{A}_2 \cdot \bar{A}_1 \cdot \bar{A}_0$$

$$D_1 = \bar{A}_3 \cdot \bar{A}_2 \cdot \bar{A}_1 \cdot A_0$$

$$D_2 = \bar{A}_2 A_1 \bar{A}_0 \quad (\text{after grouping})$$

⋮

Then you can simplify the circuit above accordingly as per these expressions.