ENCODERS

COMBINATIONAL LOGIC CIRCUITS

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TOPIC OUTLINE

Binary Encoder

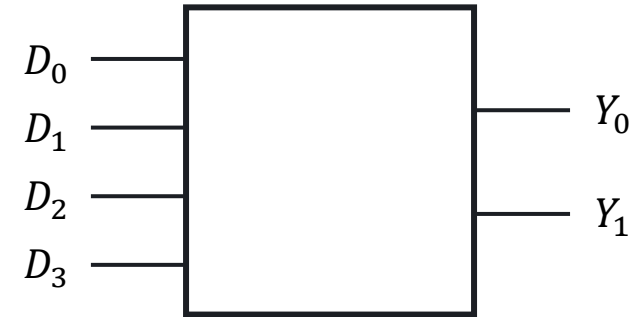**Priority Encoder**

Decimal-to-BCD Encoder

ENCODERS

BINARY ENCODER

Graphical Symbol

A **binary encoder** encodes information from 2^n

inputs into an n-bit code.

Truth Table

D_3	D_2	D_1	D_0	Y_1	Y_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

EXERCISE

Synthesize a 4-to-2 binary encoder based on its truth table.

Solution

D_3	D_2	D_1	D_0	Y_1	Y_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

PRIORITY ENCODER

D_0 —— Y_0

D_1 —— Y_1

D_2 ——

D_3 —— Z
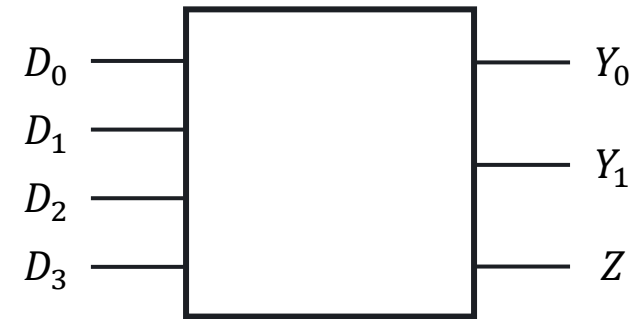
A **priority encoder** assigns a binary code to the **highest-priority** input signal and ignores other inputs with lower priority.

Truth Table

D_3	D_2	D_1	D_0	Y_1	Y_0	Z
0	0	0	0	d	d	0
0	0	0	1	0	0	1
0	0	1	x	0	1	1
0	1	x	x	1	0	1
1	x	x	x	1	1	1

EXERCISE

Synthesize a 4-to-2 priority encoder based on its truth table.

Solution

D_3	D_2	D_1	D_0	Y_1	Y_0	Z
0	0	0	0	d	d	0
0	0	0	1	0	0	1
0	0	1	x	0	1	1
0	1	x	x	1	0	1
1	x	x	x	1	1	1

DECIMAL-TO-BCD ENCODER

The **decimal-to-BCD encoder** has ten inputs − one for each decimal digit − and four outputs corresponding to the BCD code.

Graphical Symbol
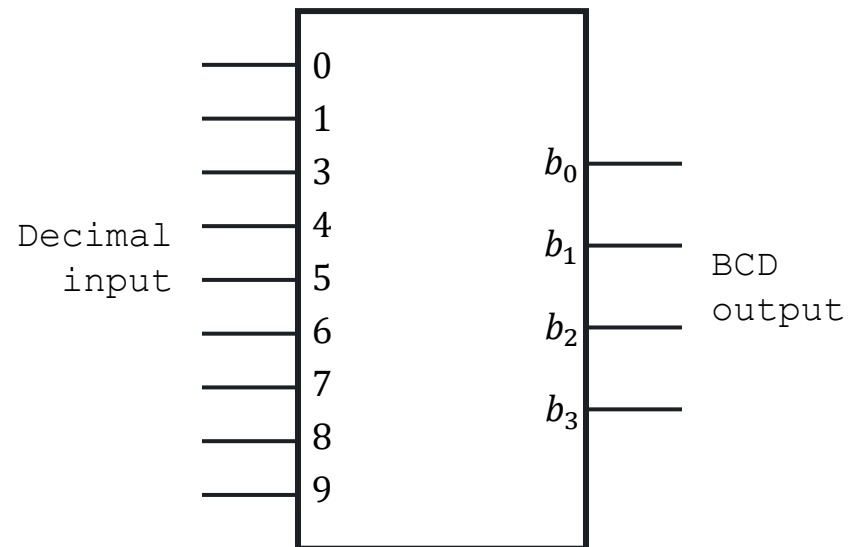
Truth Table

Decimal	BCD Code			
	b_3	b_2	b_1	b_0
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

EXERCISE

Synthesize a decimal-to-BCD encoder based on its

truth table.

Solution

Decimal	BCD Code			
	b_3	b_2	b_1	b_0
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

LABORATORY