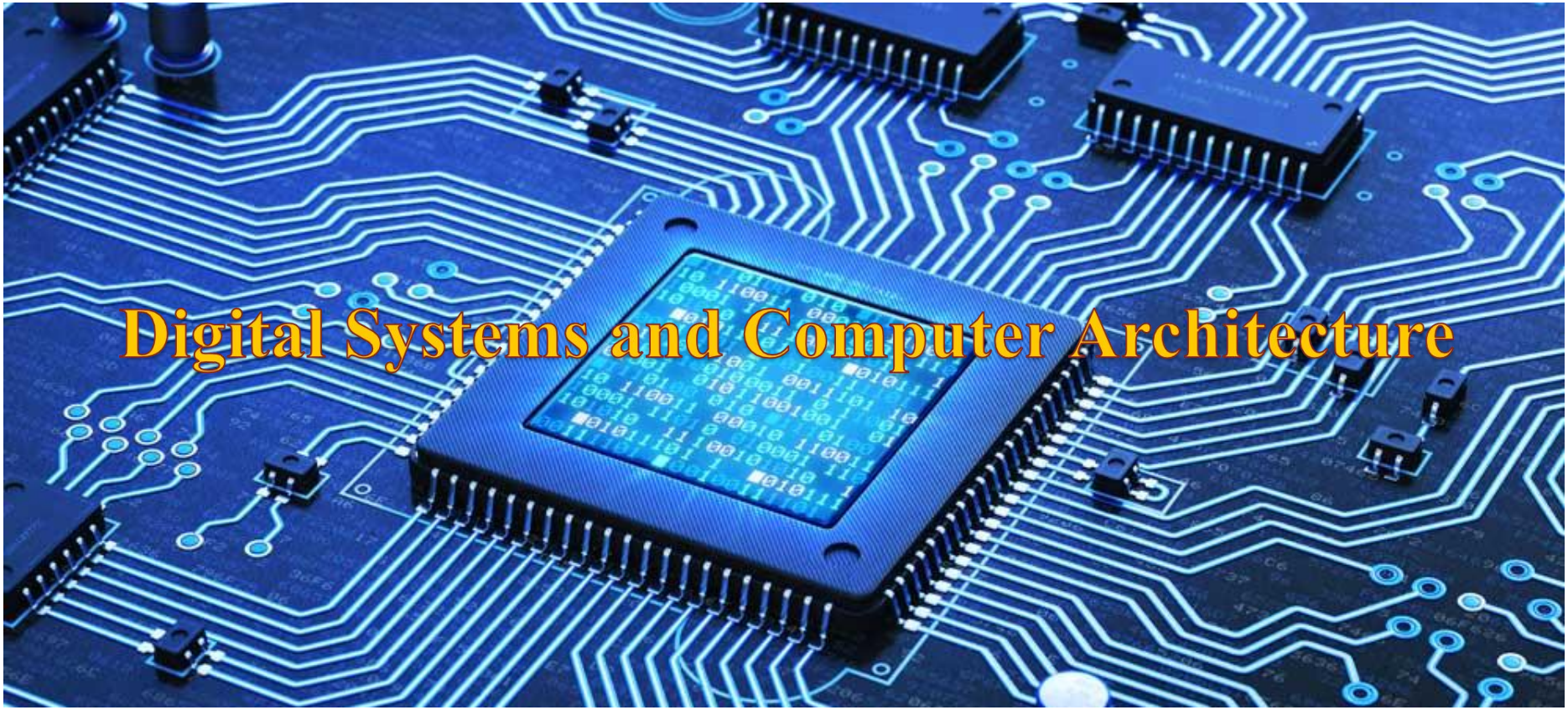


Session 2.8

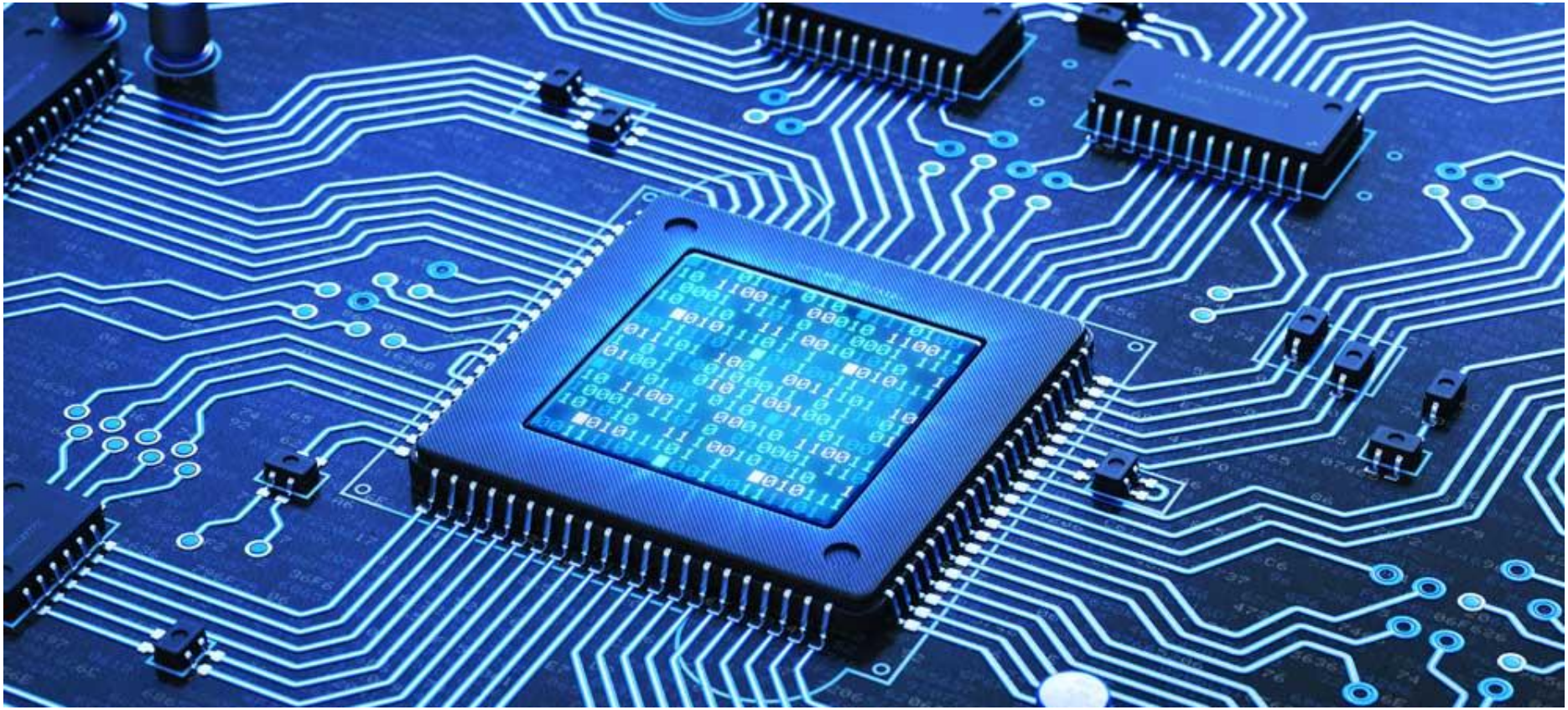
Module 2

Mouli Sankaran

Multiplexers

Session 2.8: Focus

- Multiplexers (MUX)
  - 2-to-1 line MUX Implementation
  - 4-to-1 line MUX Implementation
  - MUX Symbols/Representation
- Multiplexers (MUX)
- Real-life Applications of MUX



Multiplexer (MUX)

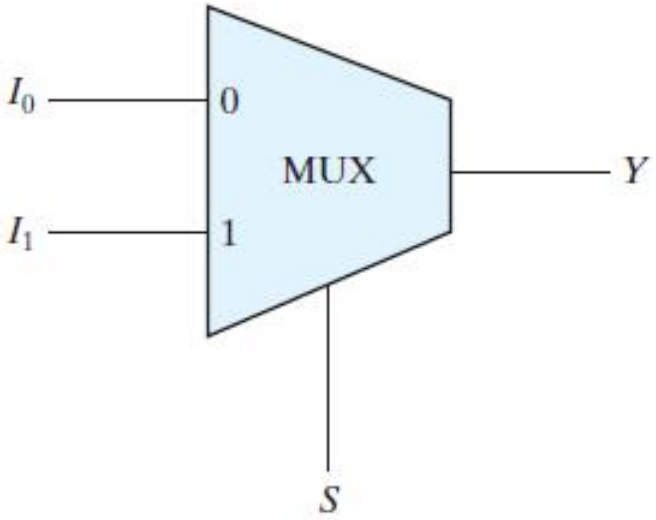
Multiplexer (MUX)

- A multiplexer (**MUX**) is a device that **allows** digital **information** from **several sources** to be **routed** onto **a single line** for transmission
- A basic **MUX** has **several data-input lines** and **a single output line**
- It has **data-select inputs**, which permit digital data on any one of the **inputs** to be **switched** to the **output** line
- Multiplexers are also known as **data selectors**

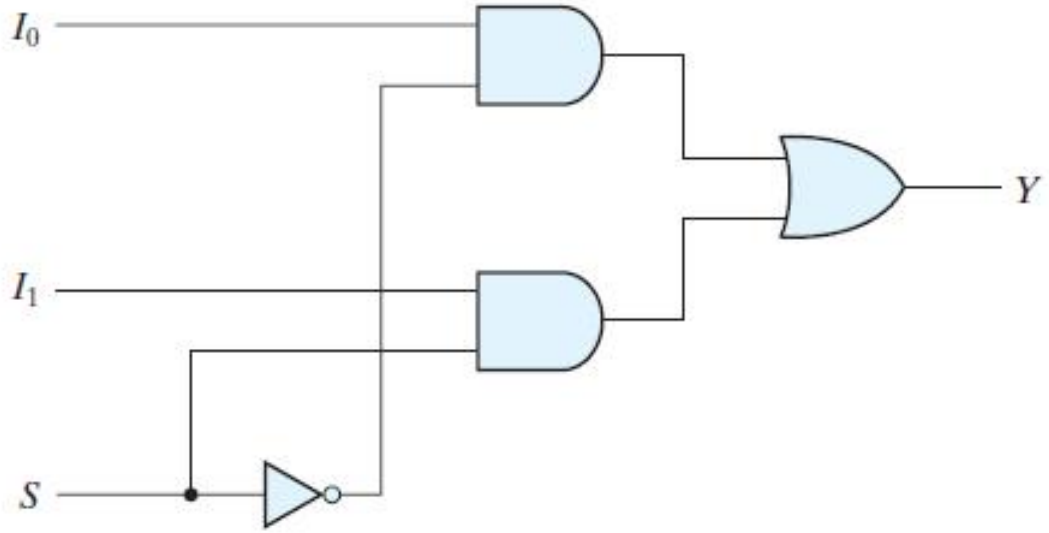
2-to-1 line Multiplexer

- When **S = 0, I_0** will be available at **Y**
- When **S = 1, I_1** will be available at **Y**

S is a **Select** Signal



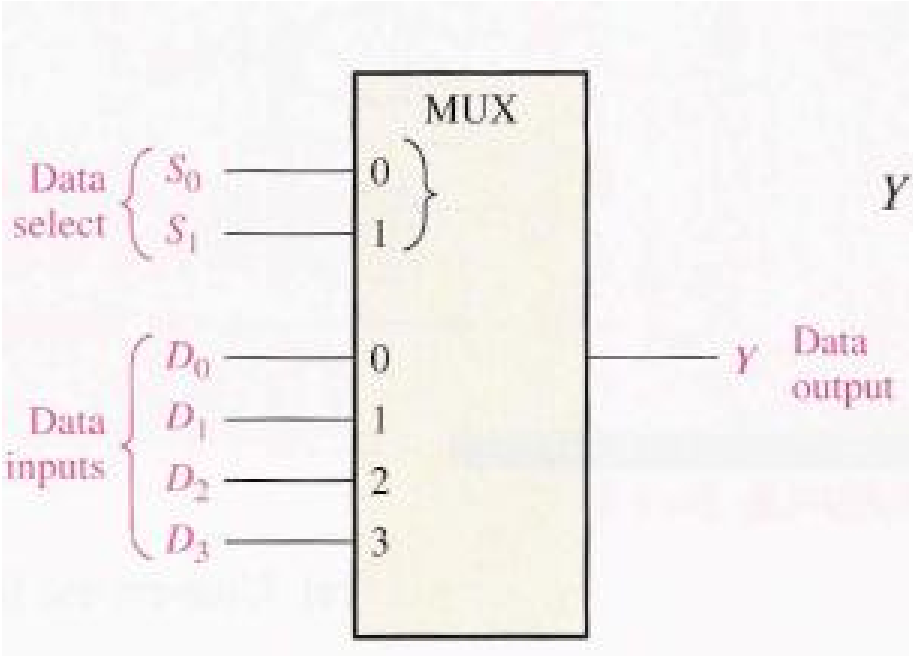
(b) Block diagram



(a) Logic diagram

4–to-1 line Multiplexer

DATA-SELECT INPUTS S_1	S_0	INPUT SELECTED
0	0	D_0
0	1	D_1
1	0	D_2
1	1	D_3



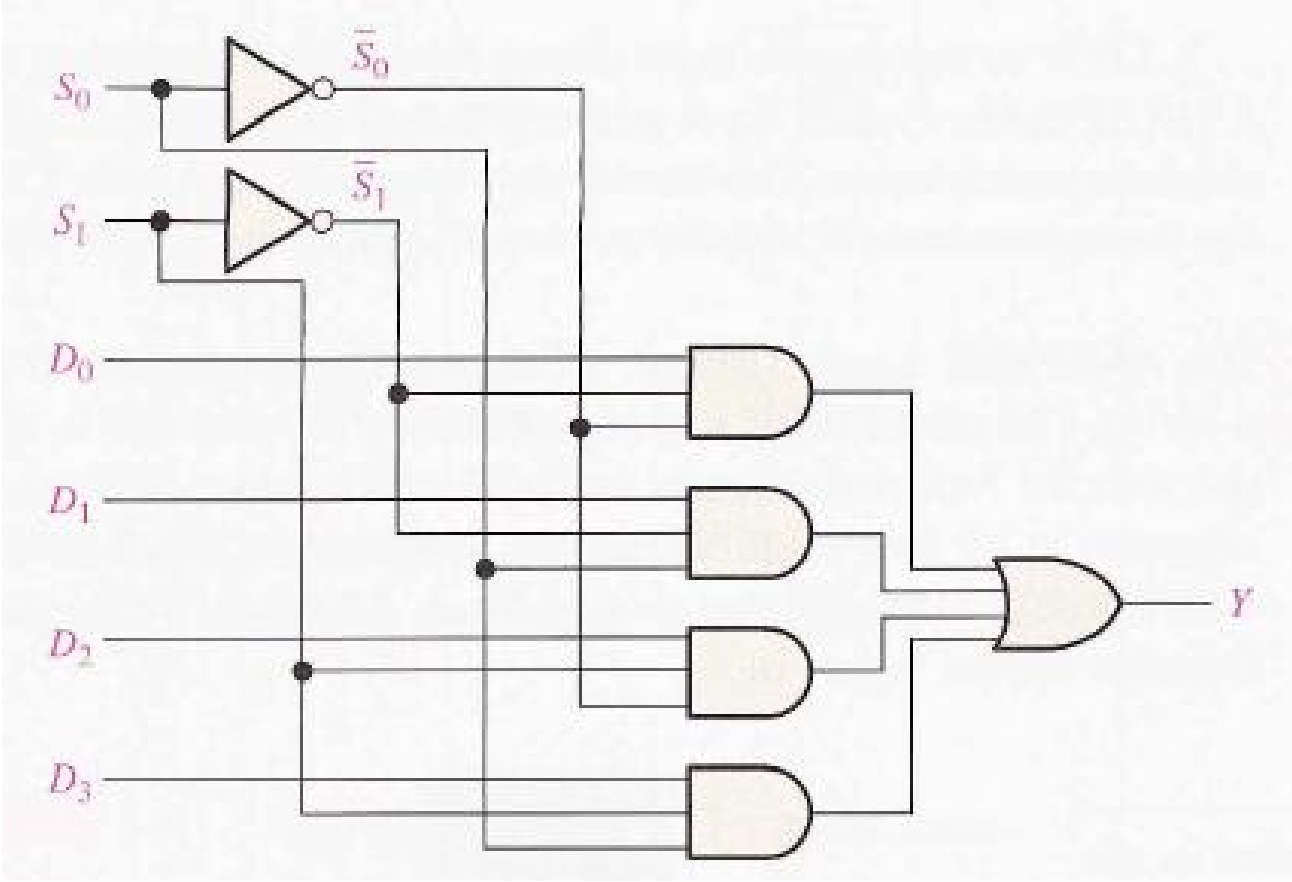
$$Y = D_0\bar{S}_1\bar{S}_0 + D_1\bar{S}_1S_0 + D_2S_1\bar{S}_0 + D_3S_1S_0$$

Implementation: 4-to-1 line Multiplexer

S_1	S_0	Y
0	0	D_0
0	1	D_1
1	0	D_2
1	1	D_3

(b) Function table

$$Y = D_0\bar{S}_1\bar{S}_0 + D_1\bar{S}_1S_0 + D_2S_1\bar{S}_0 + D_3S_1S_0$$

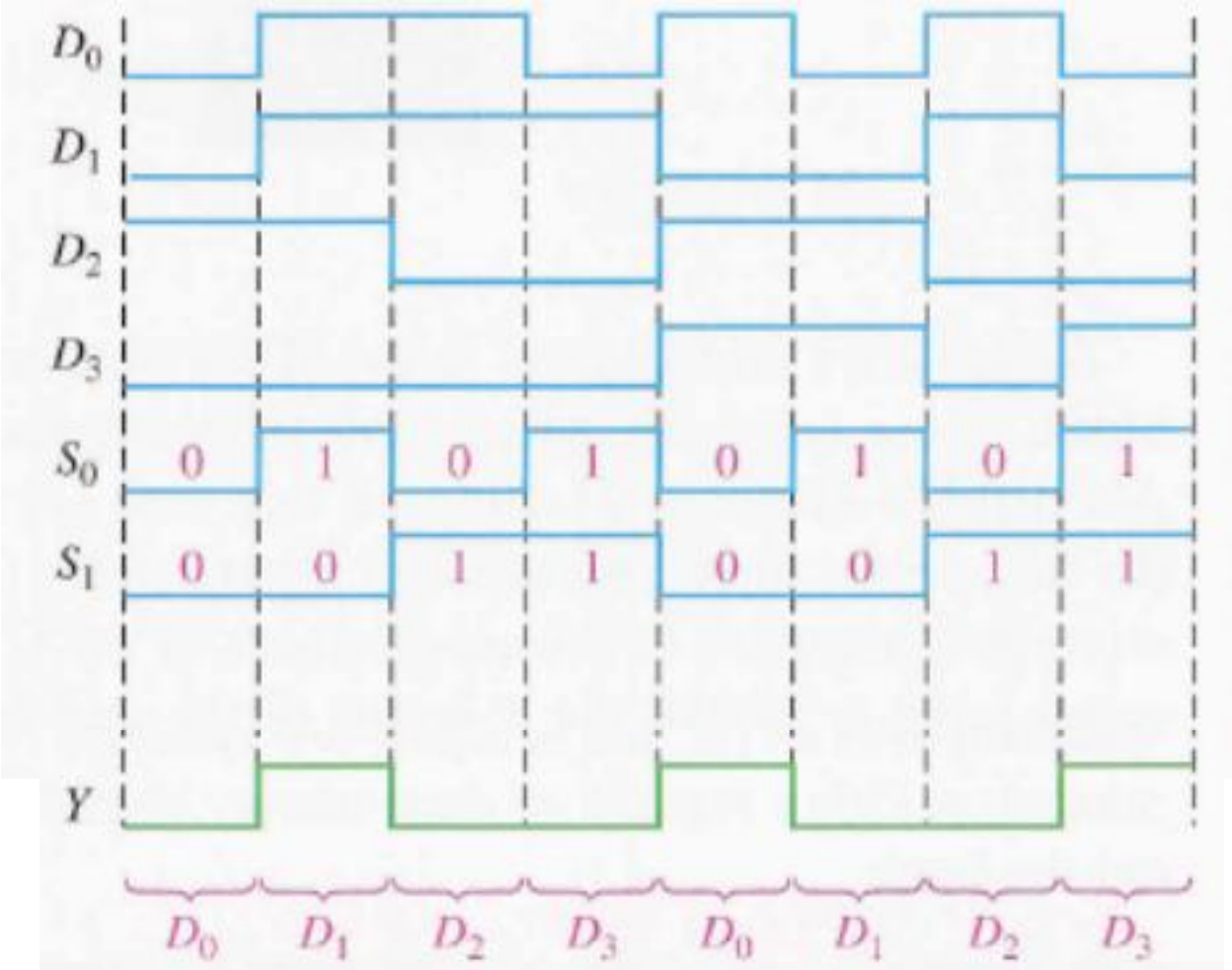


Quiz 1: Draw the Output Waveform

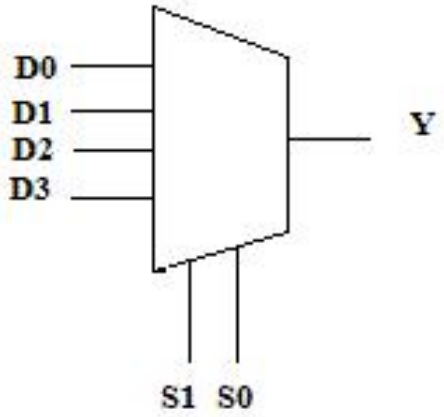
- Given the **data-input** and the **data-select waveforms**, **draw** the **output waveform**

S_1	S_0	Y
0	0	D_0
0	1	D_1
1	0	D_2
1	1	D_3

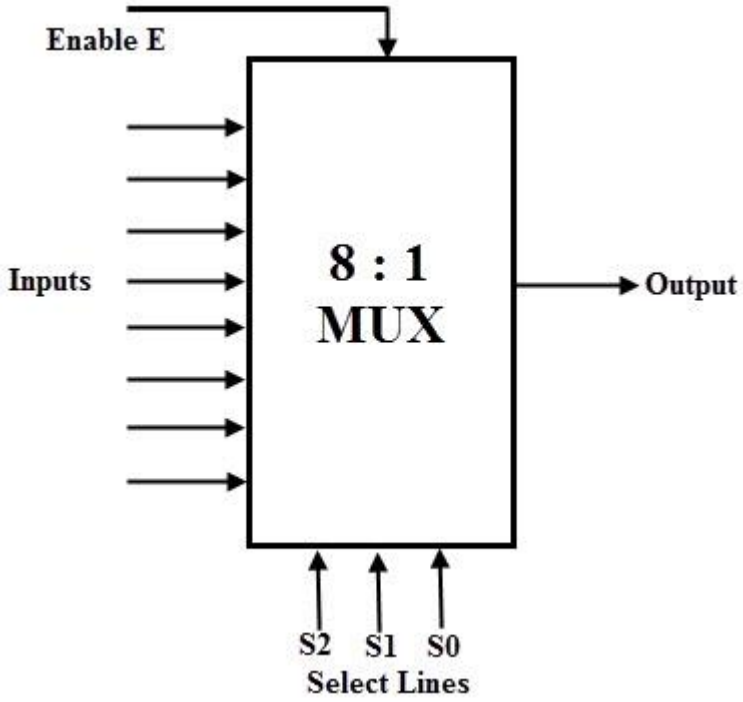
(b) Function table



Mux Symbols in Use

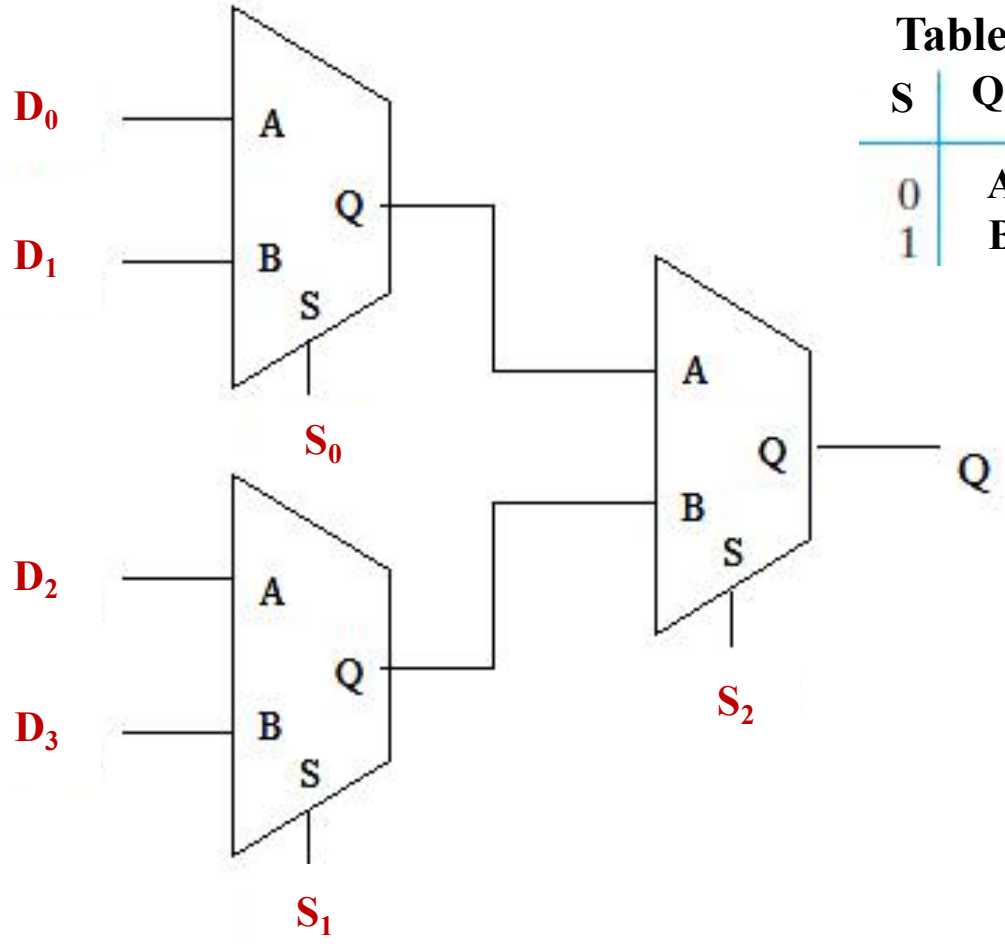


4-to-1 Line Mux



8-to-1 Line Mux

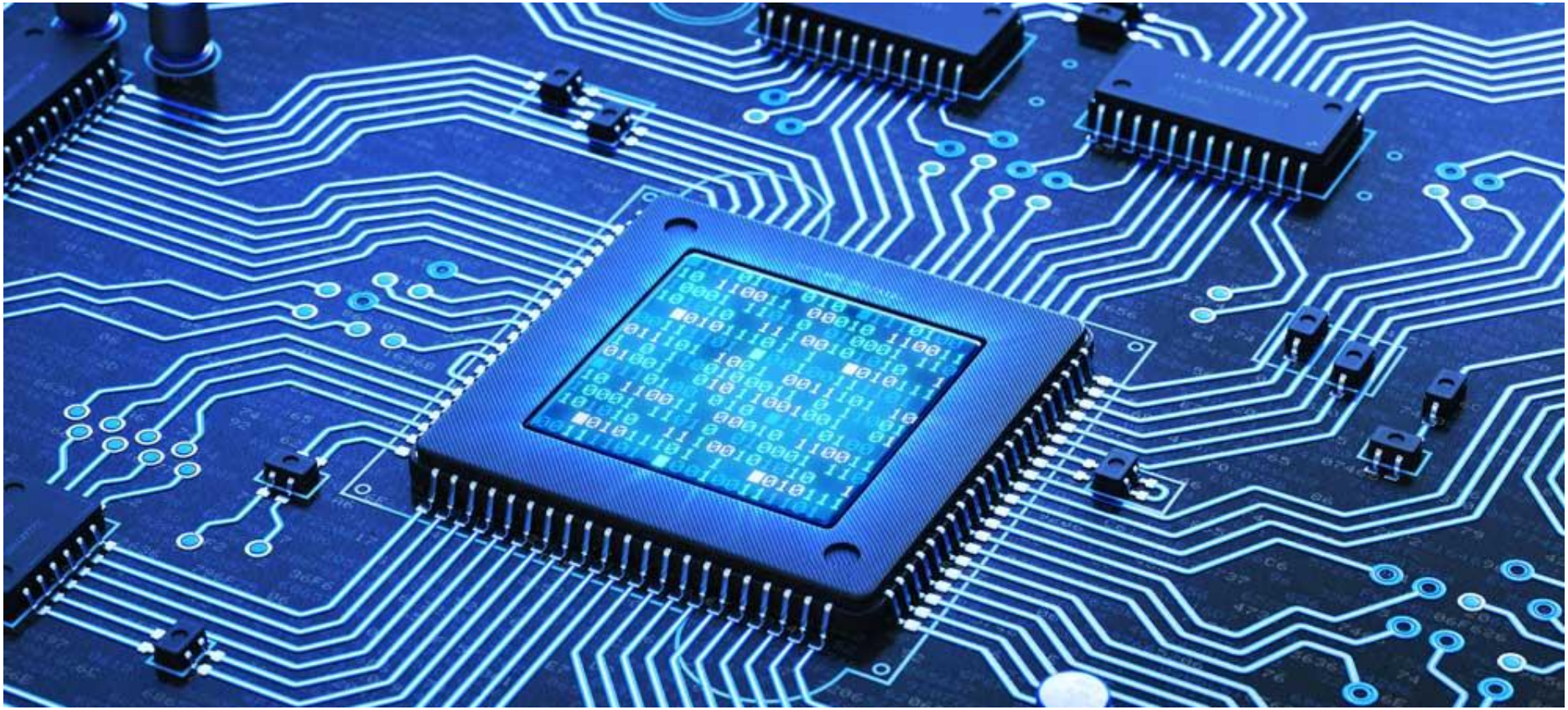
Quiz 2: What are the values at the output (Q)?



Function Table

S	Q
0	A
1	B

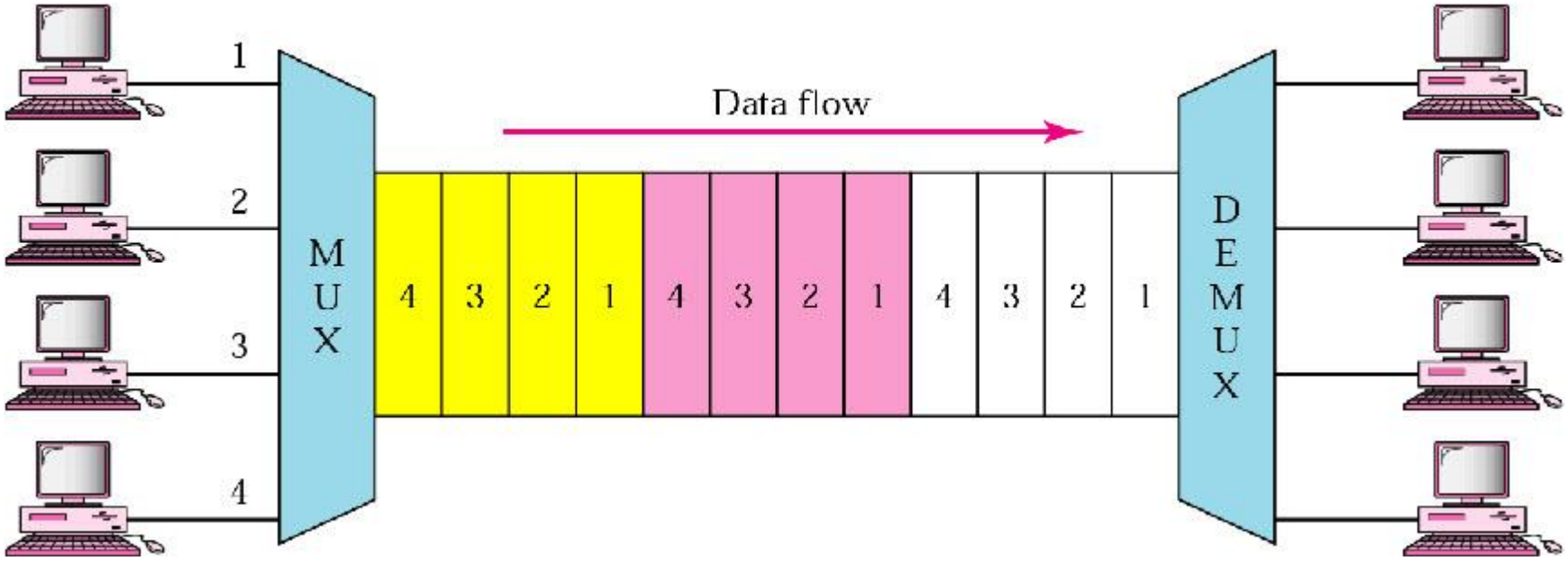
Selectors S_2	S_1	S_0	Output (Q)
0	0	0	D_0
1	1	1	D_3
1	0	1	D_2
0	0	1	D_1



Real-life Applications of MUX

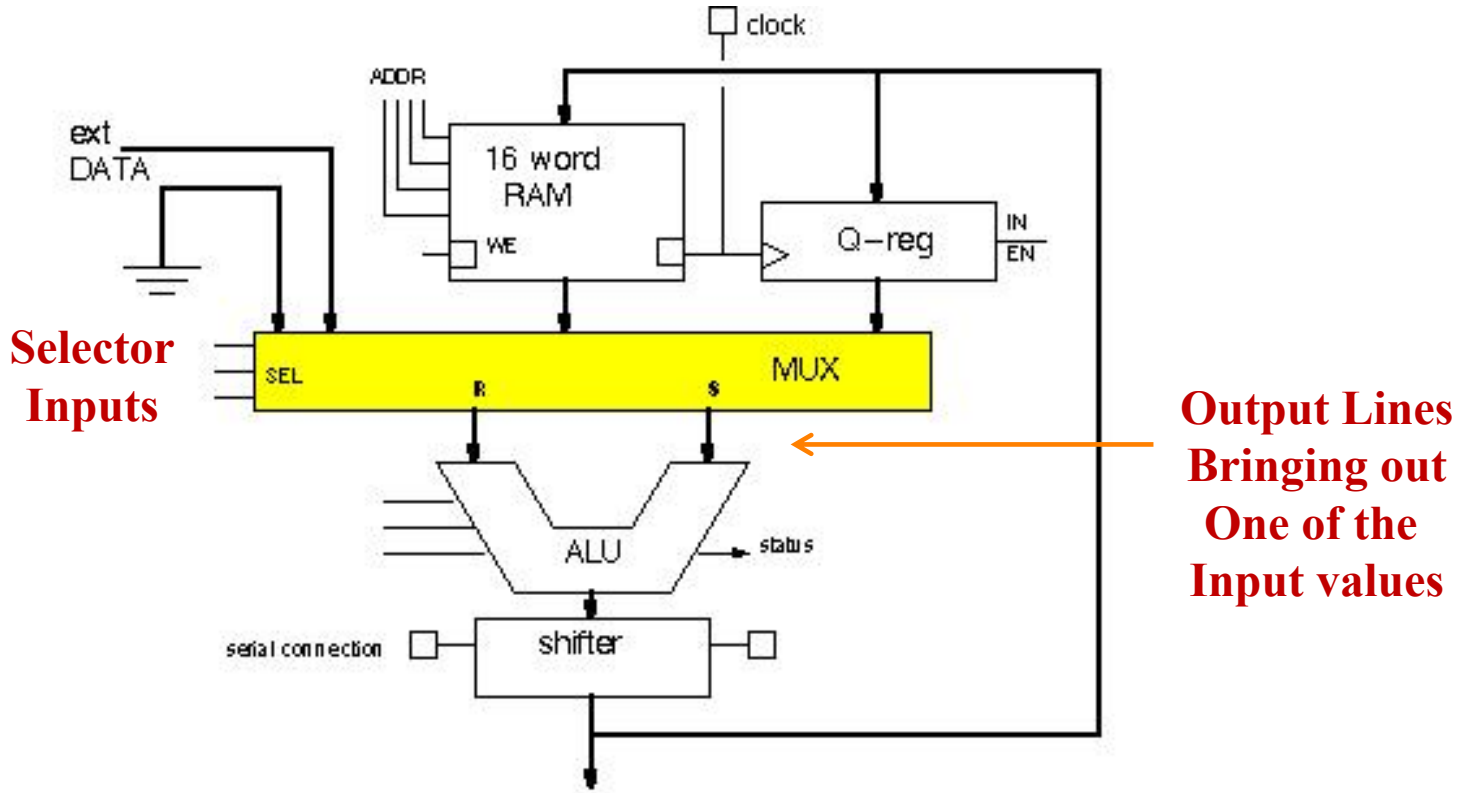
Multiplexer: Real-life Applications - 1

- **Time Division Multiplexer** (**TDM**) is one of the types of multiplexers which join data streams by allotting every stream a different time slot, in a sequence.



Multiplexer: Real-life Applications - 2

- Choosing one input from multiple input lines, to be given to Arithmetic Logic Unit (**ALU**)



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