
ELECTROVATE

Electrovate Lecture

Electronics Club

Electronics
IIT Kanpur Club

What will you do?

- Design your own problem statement
- We will provide help, mentoring and components
- Evaluation based on uniqueness, innovation, presentation and actual prototype

A Small Refresher

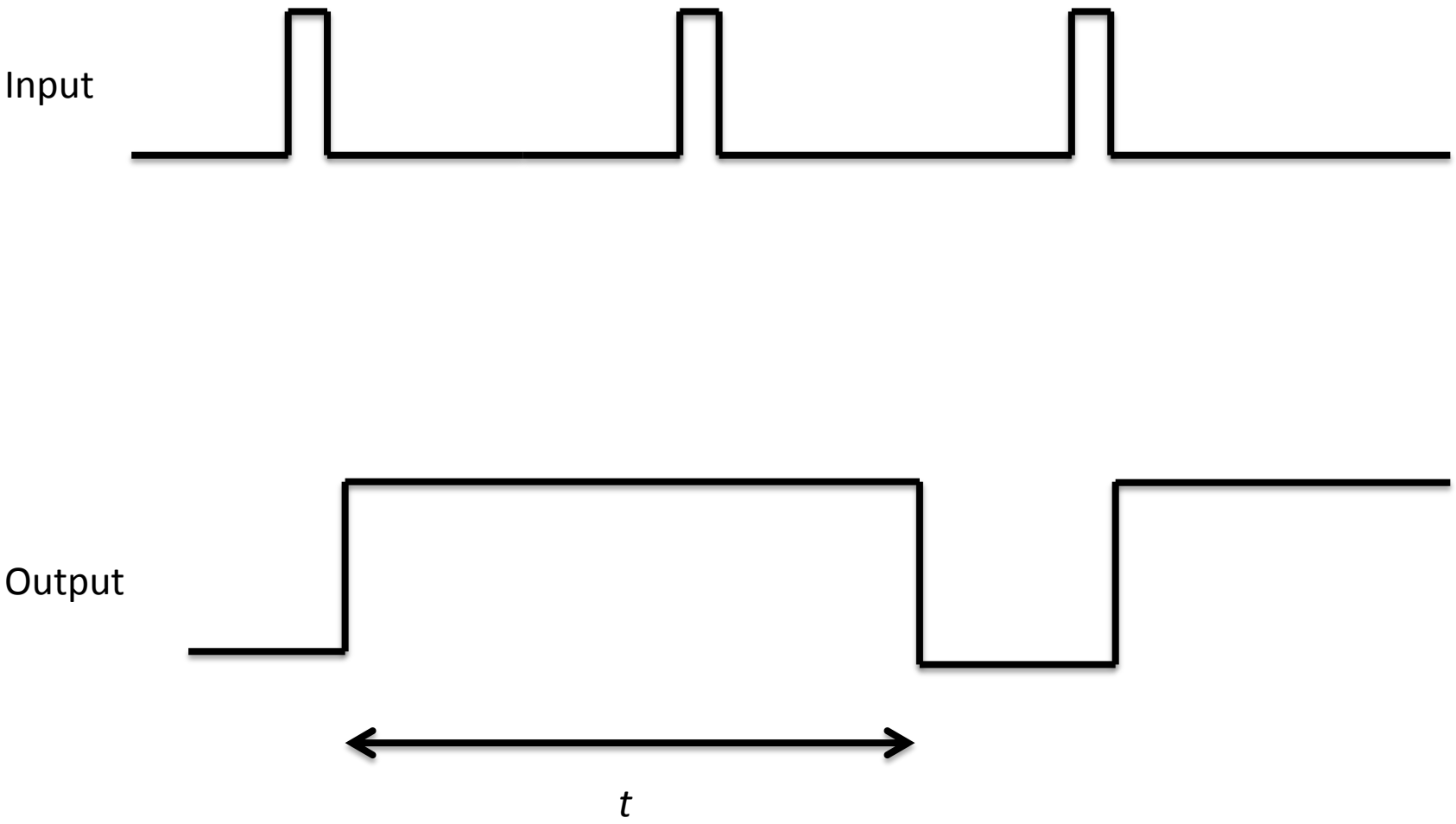
BUT FOR NOW…

Stuff you already know

- 555 (Monostable Mode)
- 4029
- 7447

555 (Monostable Timer)

- While output is LOW, it waits for a falling edge (transition from HIGH to LOW) in input and then sets output to HIGH for time *t*
- While output is HIGH, it ignores input


Input
Output
t

4029 (Counter)

- Has one input pin, 4 output pins
- Output is always a binary number *x*
- When a rising edge (transition from LOW to HIGH) is detected on the input pin (CLK), output is incremented by 1 to (*x +1*)
- After reaching maximum value, on detecting a rising edge on input, output reverts to 0

7447 (BCD Decoder)

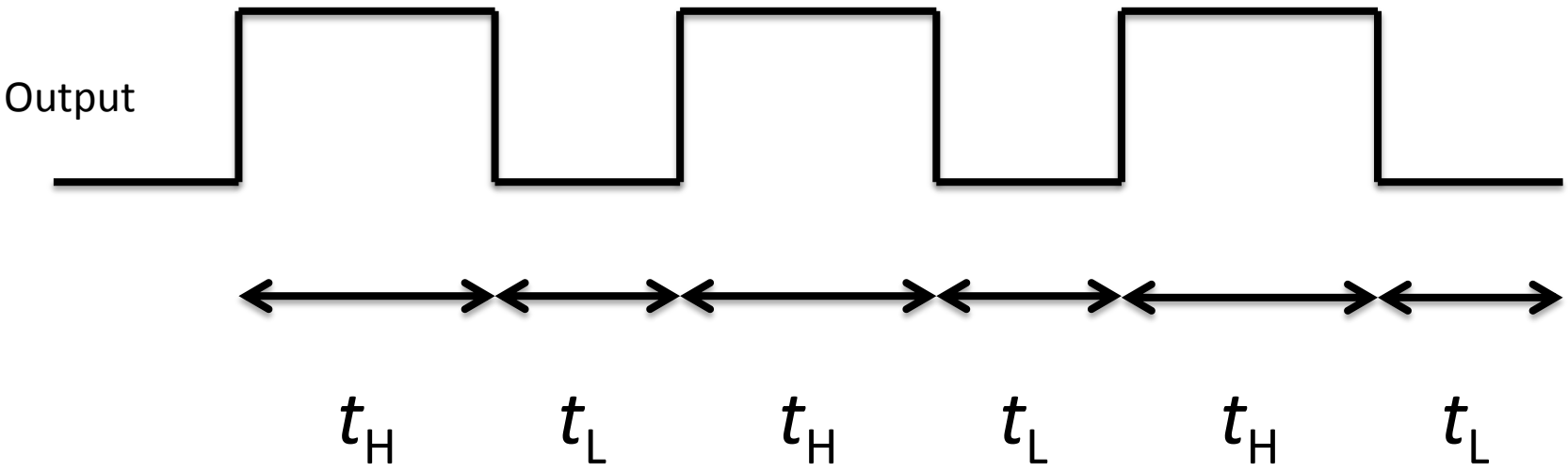
- Receives 4-bit binary number as input
- Output directly connected to BCD display

For more flexibility

NEW STUFF

555 (Astable mode)

- No input, only output
- Output is a rectangular wave
- HIGH time and LOW time is user defined


Output
t_H
t_L
t_H
t_L
t_H
t_L

Where do I get the circuit?

- In the datasheet
- Compilation of all information about a particular IC
- Includes circuit diagrams and formulae to calculate timings

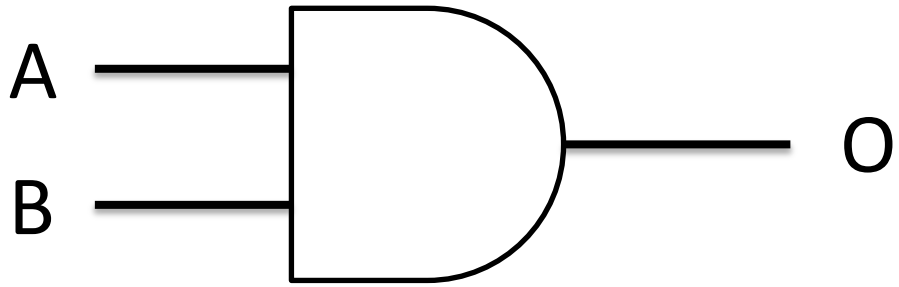
Where do I get the datasheet?

Students.iitk.ac.in/eclub

More stuff!

- Boolean operations
- AND, OR, NOT, NAND, NOR, XOR

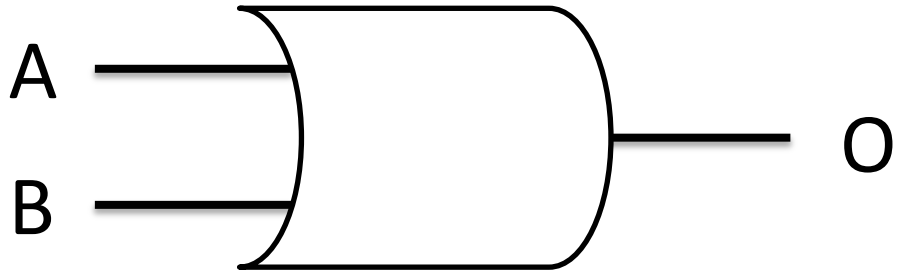
AND (4081)



A	B	O
0	0	0
0	1	0
1	0	0
1	1	1

$$O = A.B$$

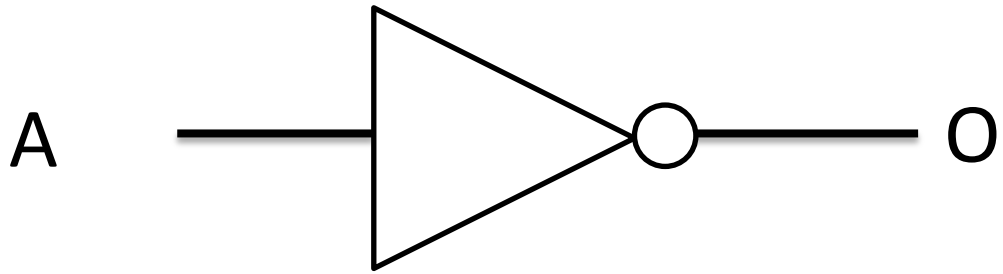
OR (4071)



A	B	O
0	0	0
0	1	1
1	0	1
1	1	1

$$O = A+B$$

NOT (4069)



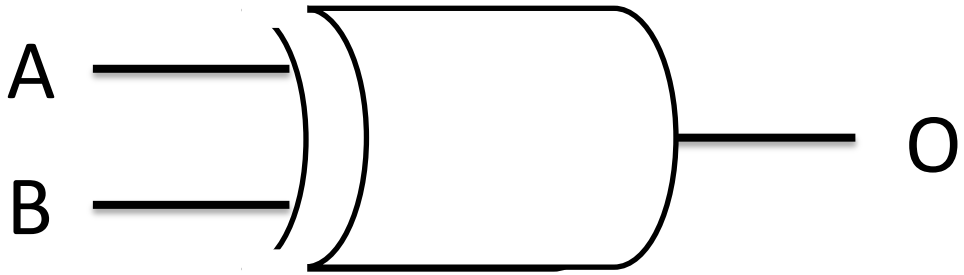
A	O
0	1
1	0

$$O = \overline{A}$$

Others…

- NAND – NOT of AND
- NOR – NOT of OR

XOR (4070)



A	B	O
0	0	0
0	1	1
1	0	1
1	1	0

$$O = A \hat{} B$$

What more?

MULTIPLEXERS AND DEMULTIPLEXERS

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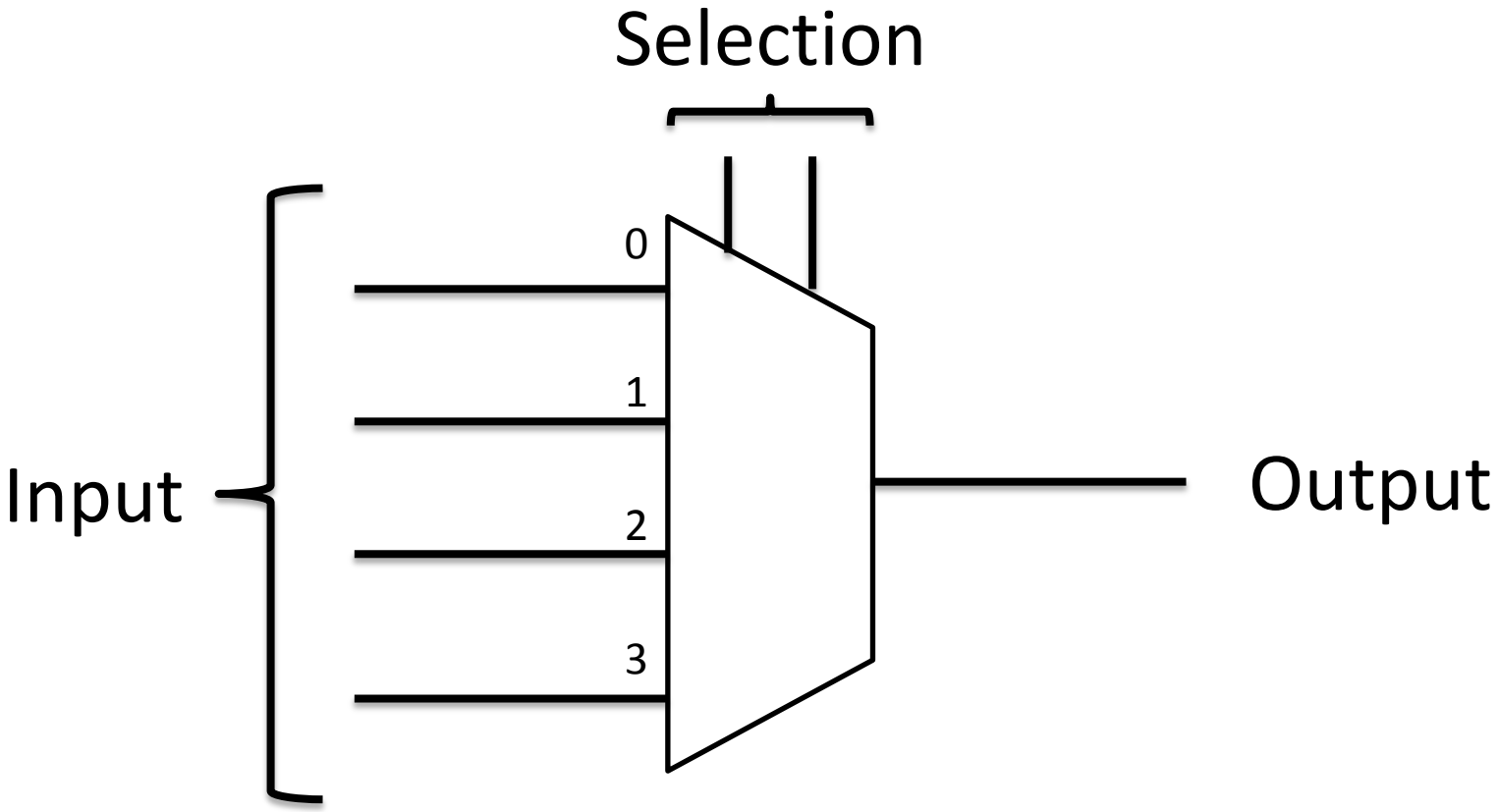
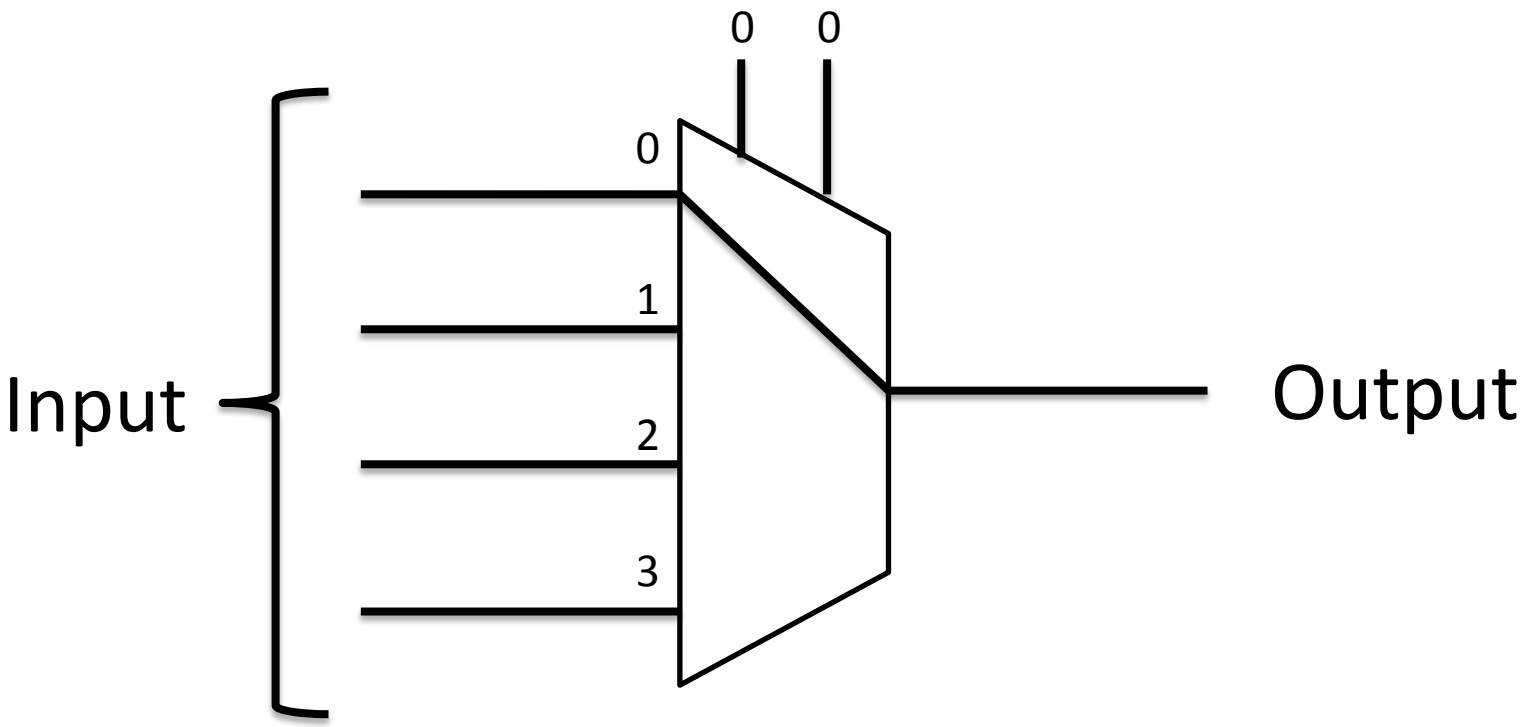
Multiplexer

- Multiple input, one output
- A single input line is connected electrically to the output
- The selection of the input line is done via separate input

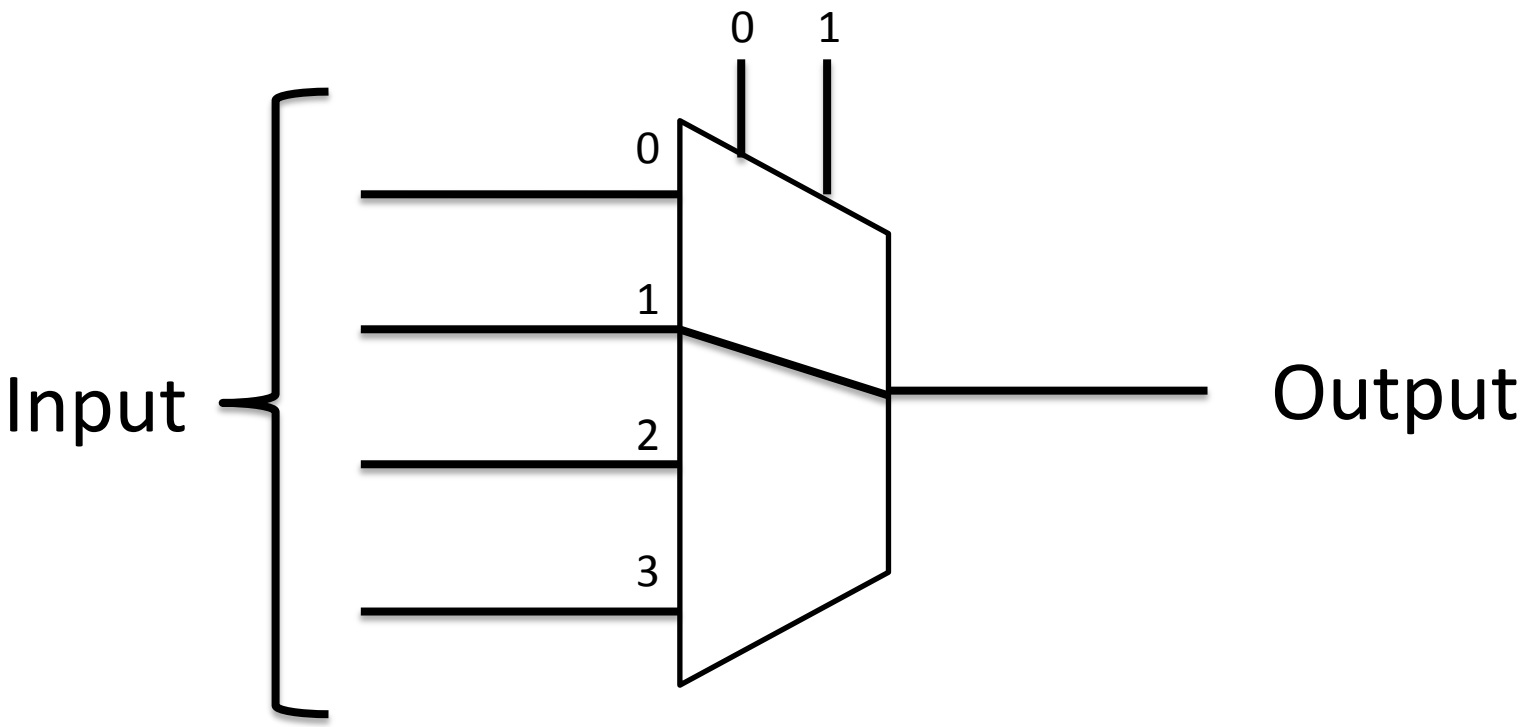
Multiplexer



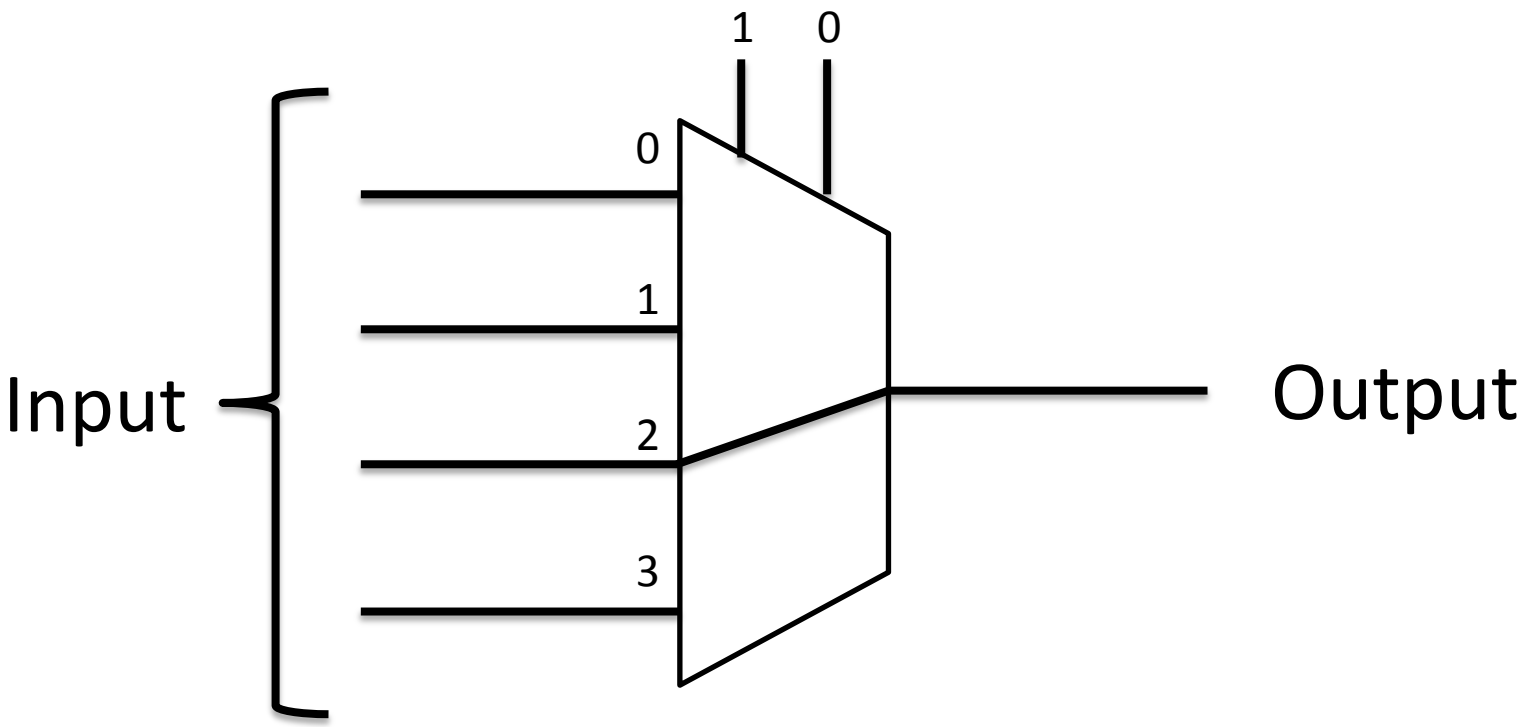
Multiplexer



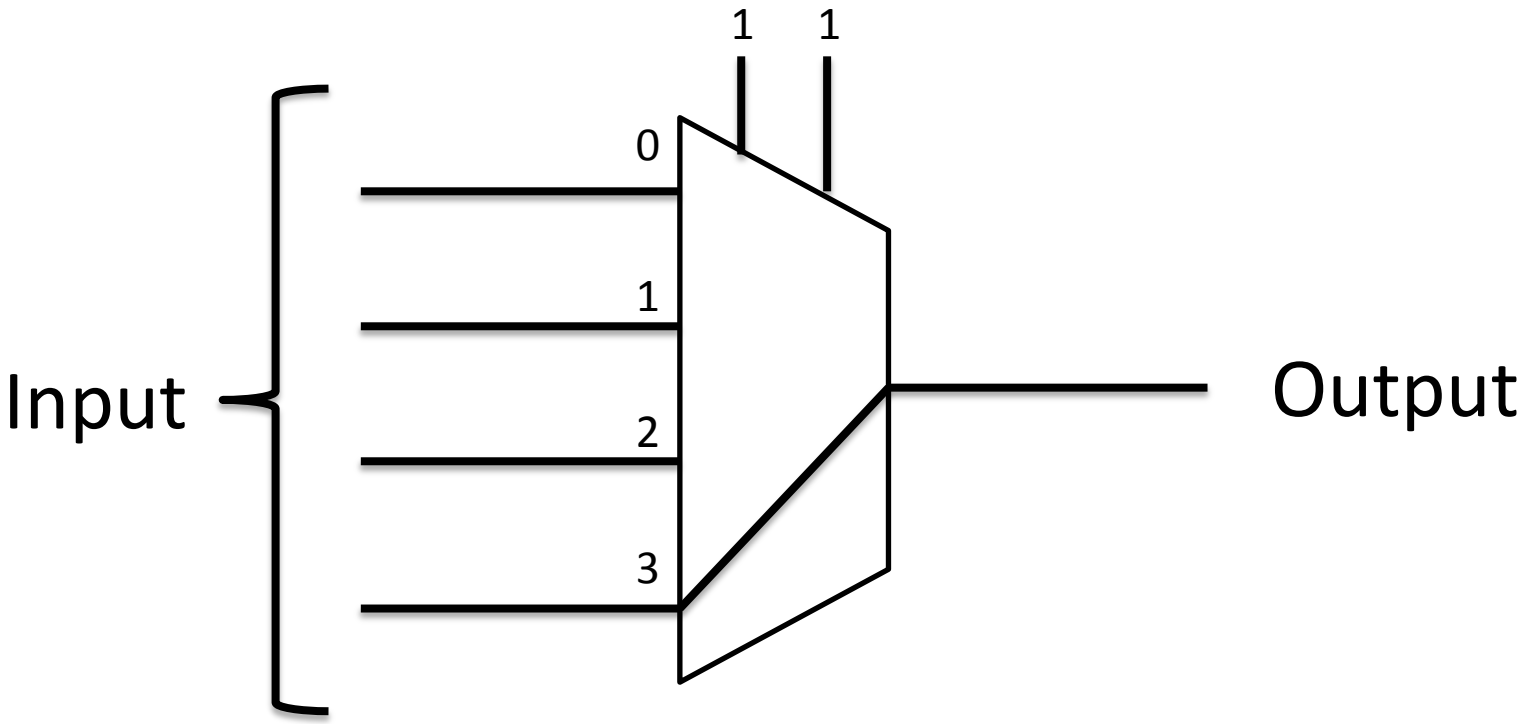
Multiplexer



Multiplexer



Multiplexer



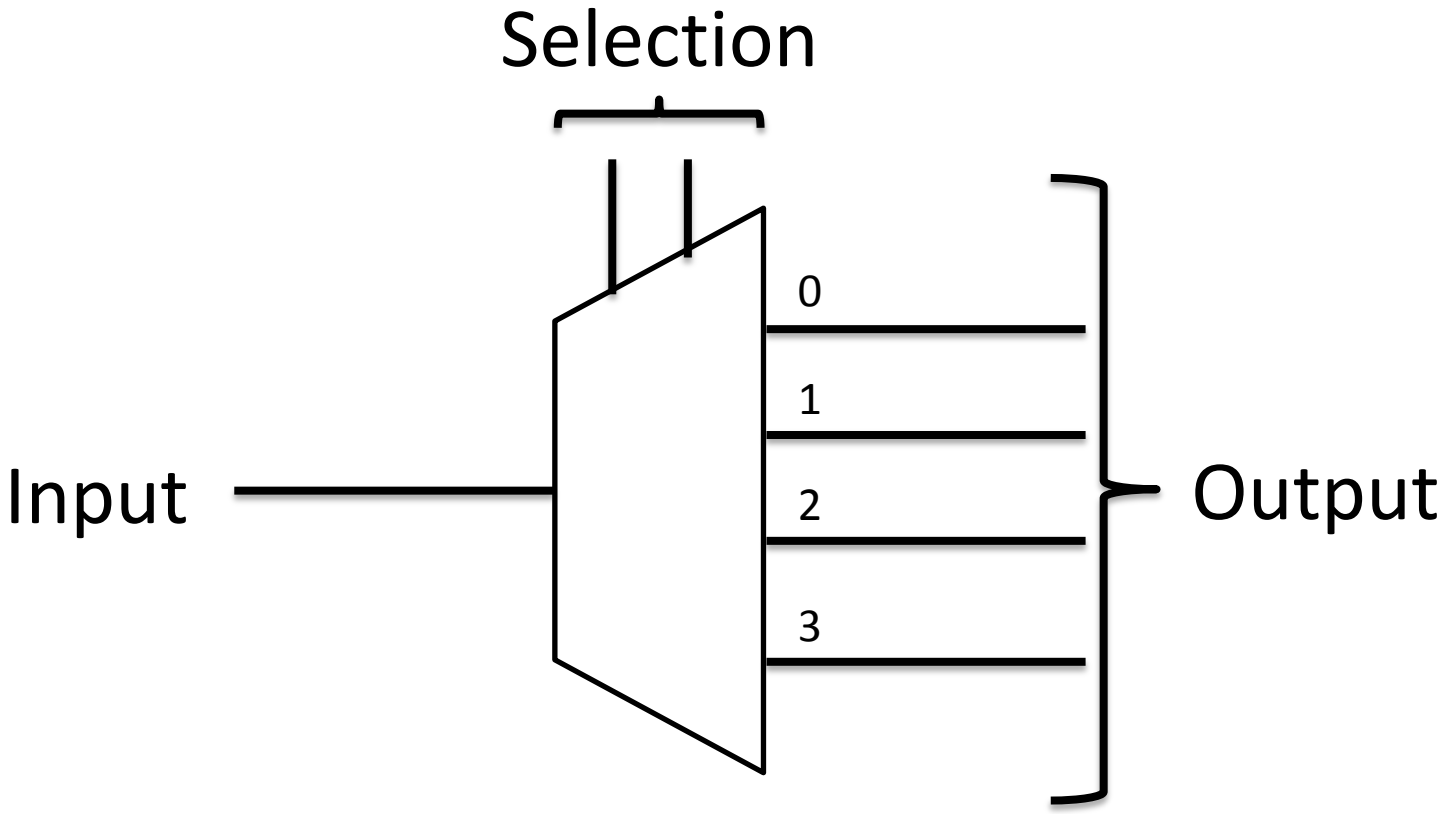
What do we mean by “Electrical”?

- Connection is analog, not digital
- Any value of voltage is copied to output, and any input current is transmitted to the output
- It is as if the input and output have been shorted by a wire

Demultiplexer

- Opposite of multiplexing
- Multiple output, single input
- Input is electrically connected to one of the output lines
- Selection of output line is done via separate input

Demultiplexer



What's the difference?

- Since the connection is electrical, same IC can act as multiplexer as well as demultiplexer
- We call this Mux-Demux
- In particular, the above IC is 4052 – a 4 X 1 Mux-Demux

Other considerations

- Electrical connection is not perfect
- Unconnected pins are left floating

Let’s get cracking!

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What do you need to know?

- All information is available at the Electrovate site:
- **http://students.iitk.ac.in/eclub/electrovate**
- As previously mentioned, you design your own problem statement

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Example Problem Statements

- Roulette (as demonstrated in Techkriti circuit)
- Stopwatch
- Traffic Lights
- Electronic Voting Machine
- Others…

Some rules

- Minimum 3 people per team, maximum 4
- You must have a problem statement for your team and an idea of how you are going to implement it
- Maximum of 2 breadboards per team
- You are encouraged to explore other ideas and other ICs

Next on Schedule

COMPONENTS ISSUE: 18TH AUGUST

8:00 PM TO 10:00 PM AT ELECTRONICS CLUB IN HALL 3

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Some Final Words

- Keep in contact with the secretaries in your hall – details are available at club website
- In case of any problem regarding your circuit, contact a secretary
- If the secretary can't help you, or any other issue, contact the coordinators

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Thank you!

Abhinav Prateek

Chirag Sangani

Sumeet Kumar

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