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SECTION : 23

GROUP : "B"

SUBJECT : DIGITAL ELECTRONICS

EXPERIMENT : 8

AIM :

Design a data acquisition system using multiplexer.

TASK TO BE DONE

In this experiment we will create a data acquisition system using AND, NOT, OR logical gates.

APPARATUS REQUIRED

(i) 5V Power Supply
(ii) Breadboard
(iii) Connecting wires
(iv) 220ohms Resistor
(v) AND Gate
(vi) NOT Gate

(vii) OR Gate

CIRCUIT DIAGRAM

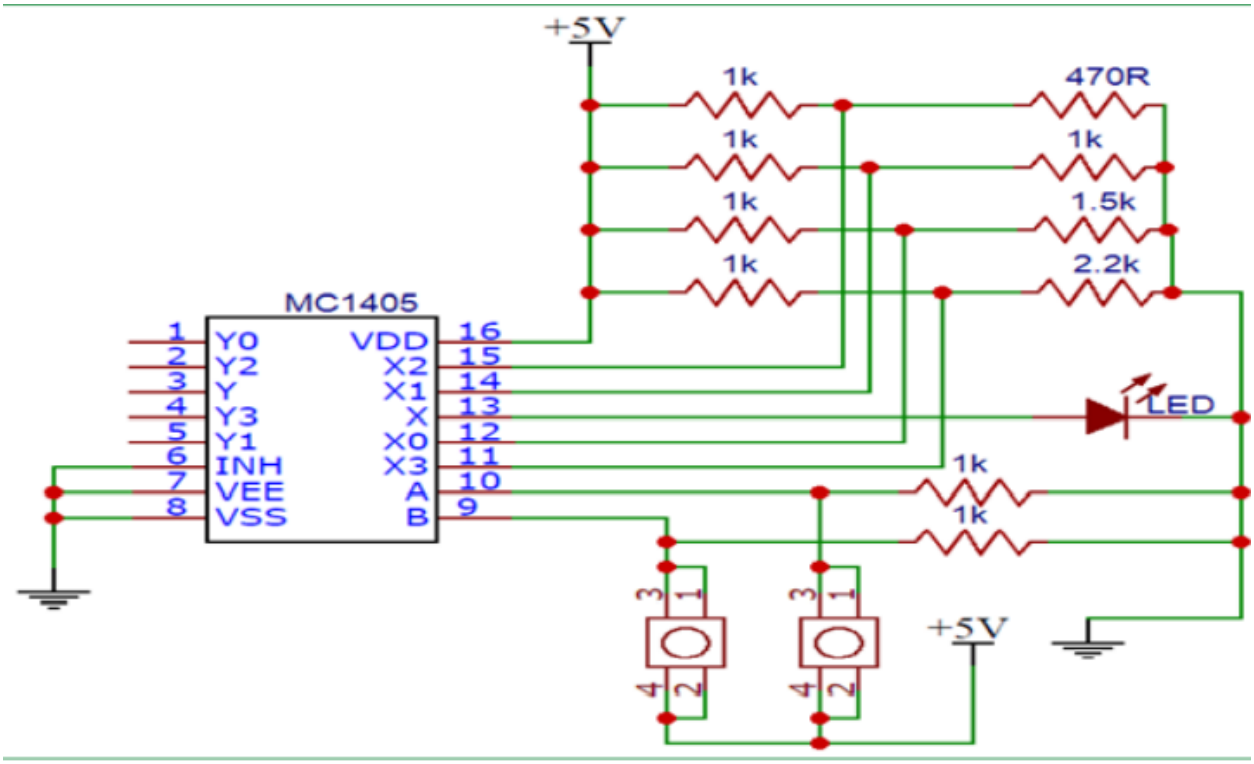


Fig 3: Circuit Diagram showing the functioning of Multiplexer.

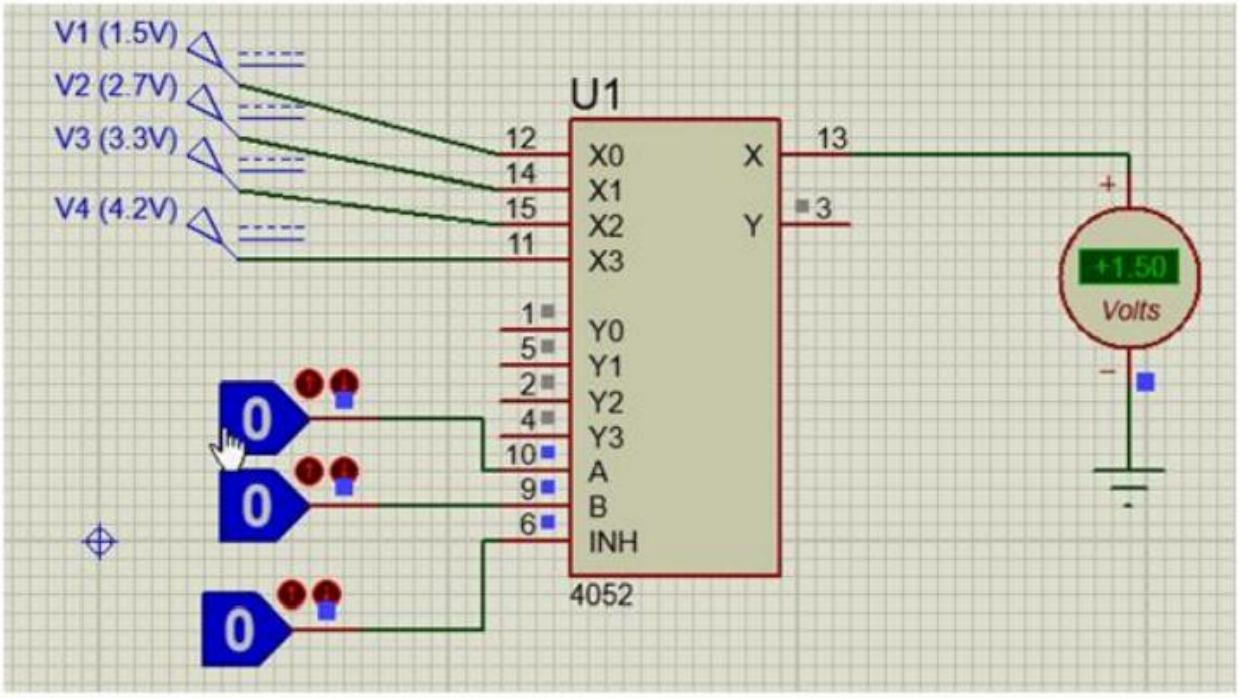


Fig 2: Schematic Diagram showing the functioning of Multiplexer

THEORY

Data acquisition (DAQ) is the process of measuring an electrical or physical phenomenon such as voltage, current, temperature, pressure, or sound with a computer. It consists of sensors, DAQ measurement hardware, and a computer with programmable software. Compared to traditional measurement systems, PC-based DAQ systems exploit the processing power, productivity, display, and connectivity capabilities of industry-standard computers providing a more powerful, flexible, and cost-effective measurement solution. In this experiment however, the focus is on DAQ system as an application of multiplexer & thus it is required to select and observe reading from any one of the input. The pins X0, X1, X2 and X3 are the four input pins and the pin X is its corresponding output pin. The control pins A and

B are used to select the required input to the output pin. The Vdd pin (pin 16) has to connect to the supply voltage which is +5V and the Vss and Vee pin should be grounded. The Vee pin is for enable which is an active low pin so we have to ground it to enable this IC. The MC14052 is an Analog Multiplexer meaning the input pins can also be supplied with variable voltage and the same can be obtained though the output pins. The input pins have The voltage 1.5V, 2.7V, 3.3V and 4.8V which are also obtained on the Output pin based on the control signal given.

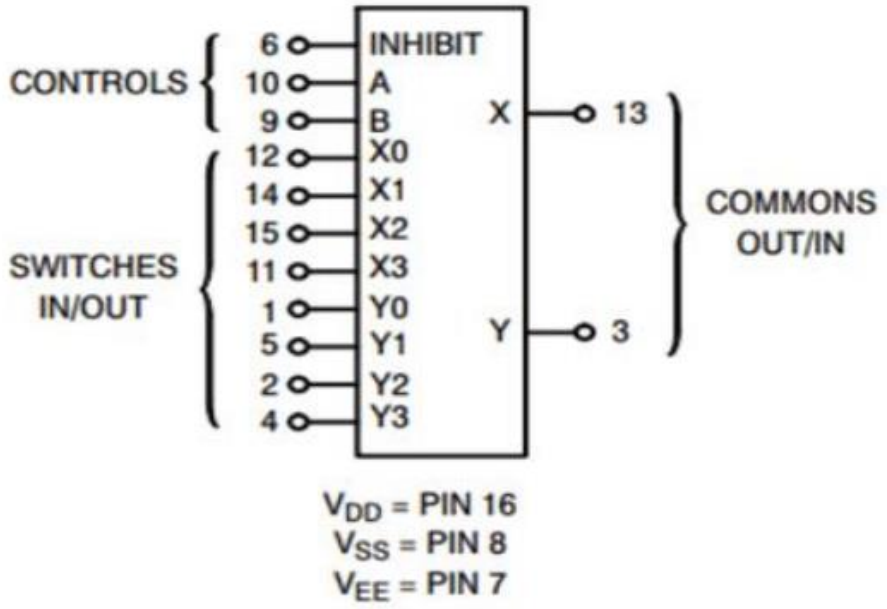
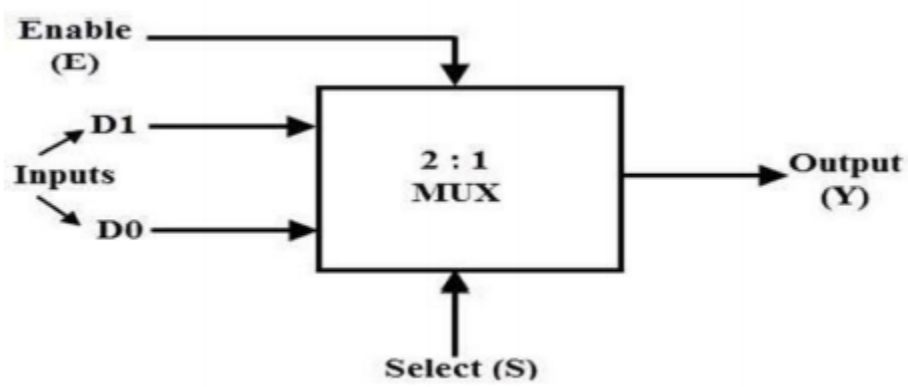


Fig 1: MC14052B IC Pinout

CONCEPT USED :

A 2-to-1 multiplexer consists of two inputs D0 and D1, one select input S and one output Y. Depends on the select signal, the output is connected to either of the inputs. Since there are two input signals only two ways are possible to connect the

inputs to the outputs, so one select is needed to do these operations. If the select line is low, then the output will be switched to D0 input, whereas if select line is high, then the output will be switched to D1 input.



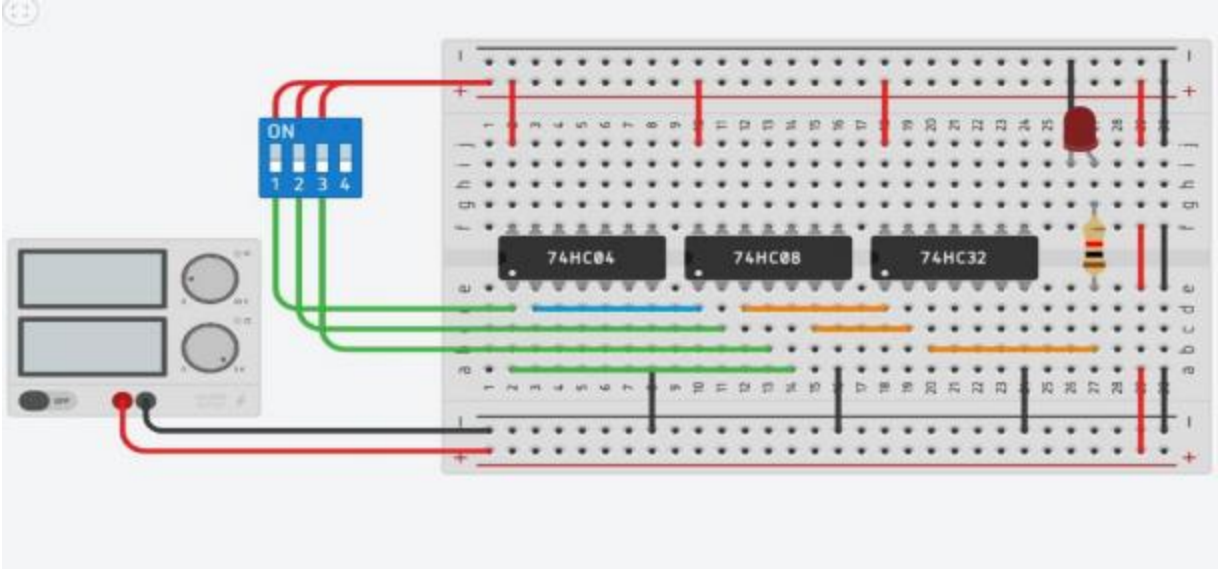
2to1MUX

The truth table of the 2-to-1 multiplexer is shown below. Depending on the selector switching the inputs are produced at outputs , i.e., D0 , D1 and are switched to the output for S=0 and S=1 respectively . Thus, the Boolean expression for the output becomes D0 when S=0 and output is D1 when S=1. From the truth table the Boolean expression of the output is given as the logic circuit of 2-to-1 multiplexer can be implemented using logic gates as shown in figure. It consists of two AND gates, one NOT gate and one OR gate. When the select line, S=0, the output of the upper AND gate is zero, but the lower AND gate is D0.

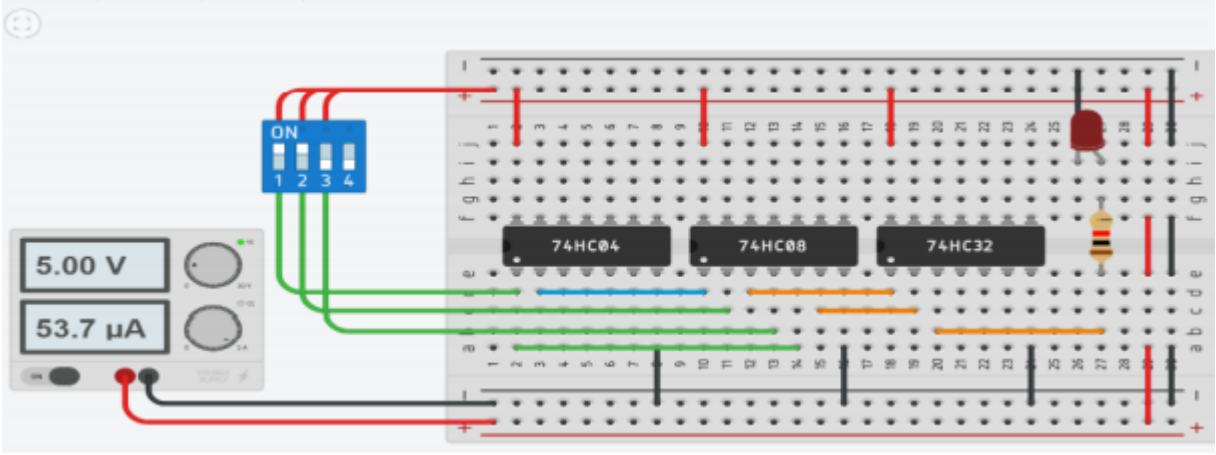
Select	Inputs		Output
0	0	0	0
0	0	1	1
1	1	0	1
1	1	1	1

OUTPUT

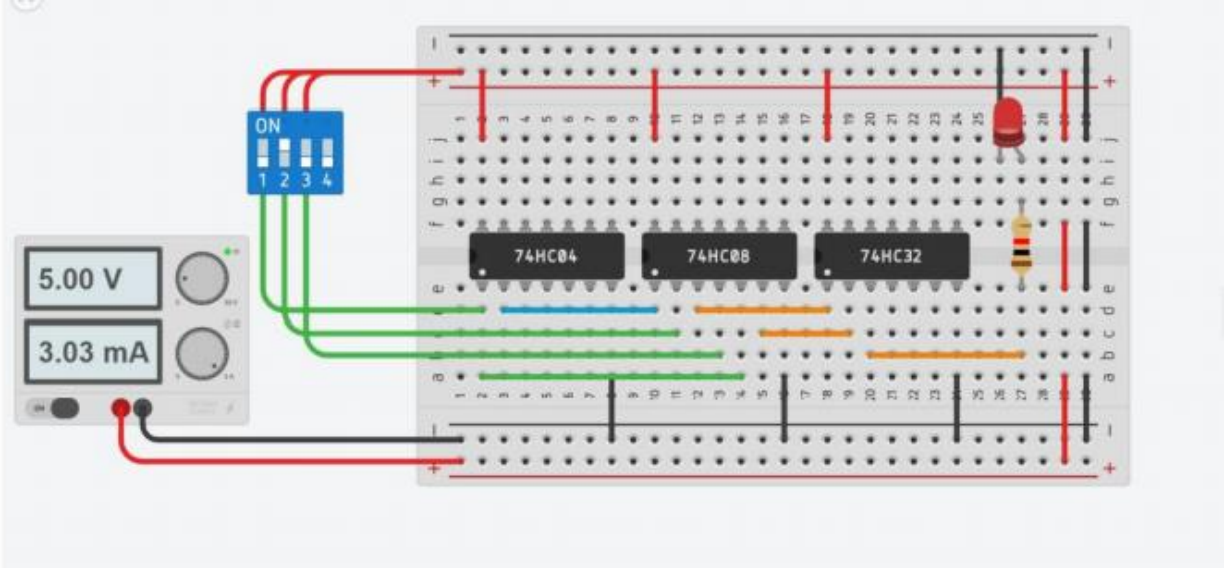
1. **WHEN ALL SWITCHES ARE OFF**



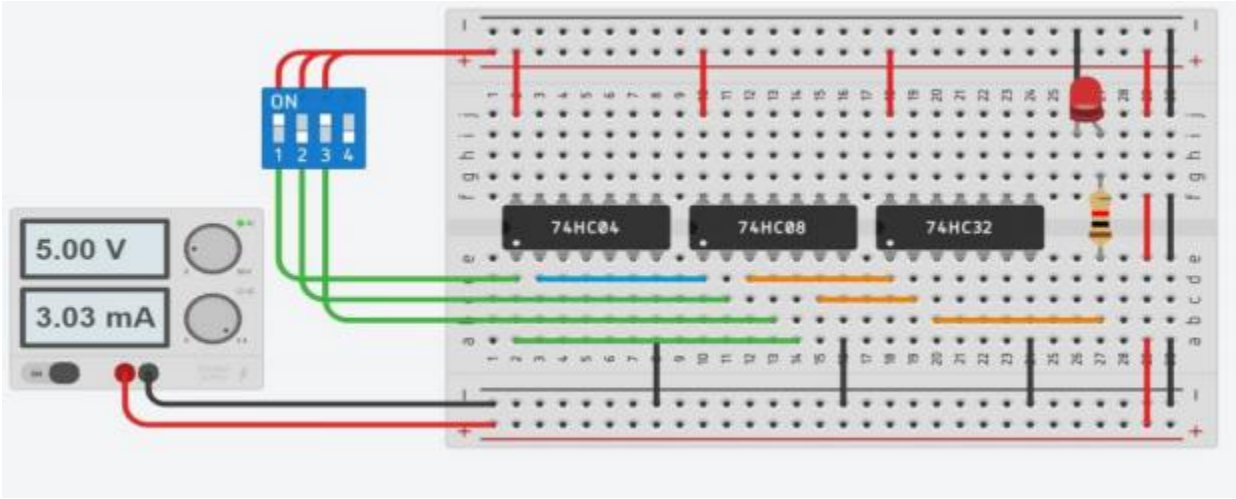
2. **WHEN ONLY SWITCH 1 IS ON**



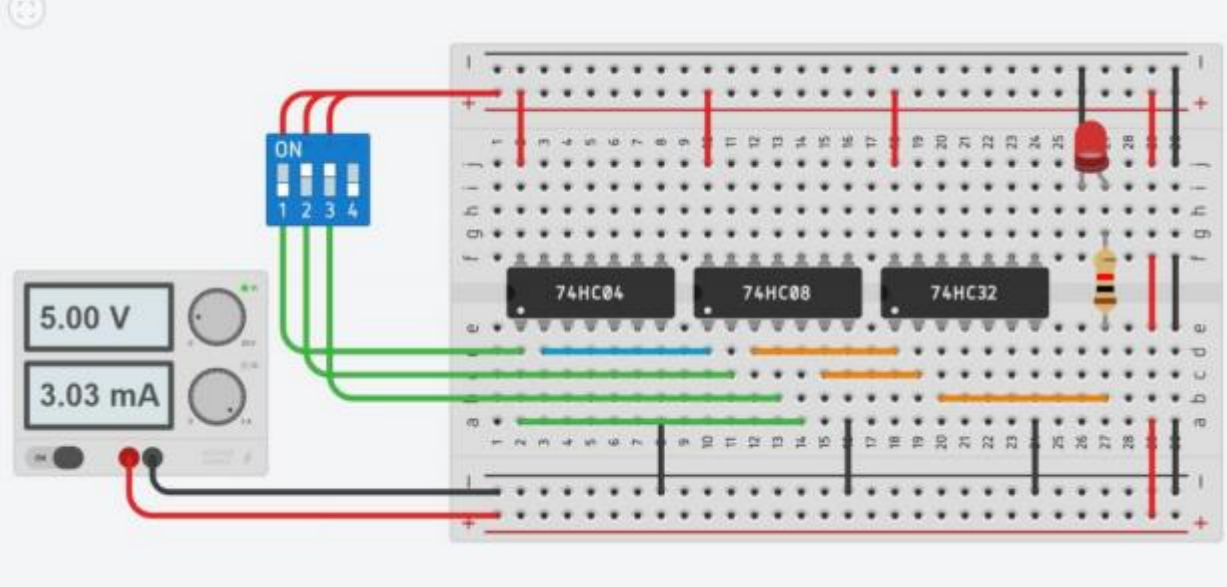
3. **WHEN ONLY SWITCH 2 IS ON**



4. WHEN SWITCH 1 AND SWITCH 3 IS ON



5. WHEN SWITCH 2 OR SWITCH 3 IS ON



OBSERVATIONS

The output generated by the OR gate is equal to D0. Similarly, when S=1, the output of the lower AND gate is zero, but the output of upper AND gate is D1. Therefore, the output of the OR gate is D1. Thus, the above given Boolean expression is satisfied by this circuit.

RESULTS

The Data acquisition system using Multiplexer has been designed and Implemented.

TROUBLESHOOTING

No problem occurs.