

# Problem Statement (Sample)

Circuit Designing  
Digital

IEEE - DELHI TECHNOLOGICAL UNIVERSITY

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## H Bridge

*H bridge* is an electronic circuit that switches the polarity of a voltage applied to a load. These circuits are often used to drive DC motors, or drive high frequency Pulse Transformers which are further used to make switched-mode power supply (SMPS) and H.V. Power Supply.

### Basic Principle

A current flows through the load either backward or forward, depending on how you connect the positive and the negative (Fig. 1).

If you close switch 1 and 4, you have positive connected to the left side of the load and negative to the other side. And the current will flow in one direction (Fig 2).

If you instead close switch 2 and 3, you have positive connected to the right side and negative to the left side. And the current flows in the opposite direction (Fig. 3).

### Problem Statement

A pulse transformer requires high current to drive because of low resistance of primary side. A high current switch is required to drive the current through the transformer. A H bridge circuit can be used here to drive the pulse transformer. A transistor/MOSFET works as a high current switch in this circuit. Design a H-Bridge circuit for the same.

### Additional Information

- a) Use Voltage source as frequency source of 1kHz to drive the circuit. No need to make a pulsing circuit/ square wave generator from scratch.
- b) Use ideal inductor to simulate pulse transformer of 1:1 ratio ( $L = 100 \mu H$ ). Load the secondary with 10K resistor.

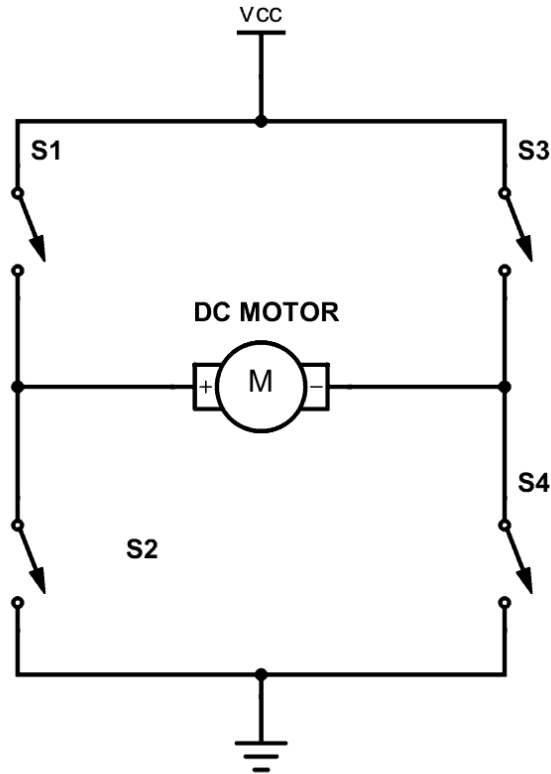


Figure 1: H Bridge basic circuit

- c) Voltage waveform of input (base/gate) of switches (transistor/MOSFET) and voltage waveform across load (Primary) will be used to evaluate points for output. Rail-to-rail voltage of H-Bridge should be 24V.
- d) Highlight the name of switches (using name S1, S2, S3, S4) that corresponds to the one used in Fig. 1

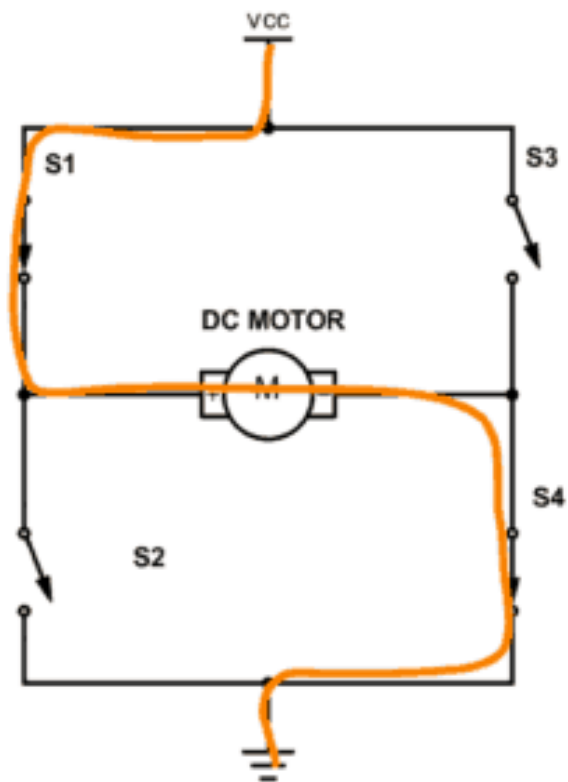


Figure 2: H Bridge driving current in one direction

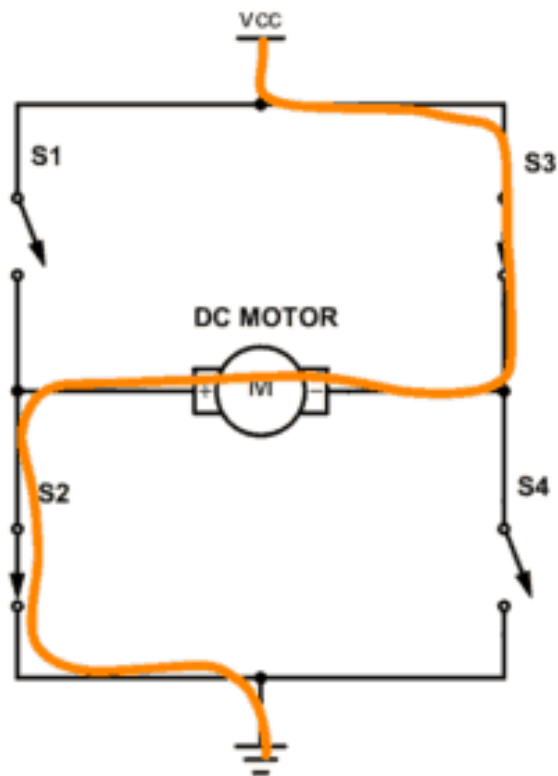


Figure 3: H Bridge driving current in opposite direction