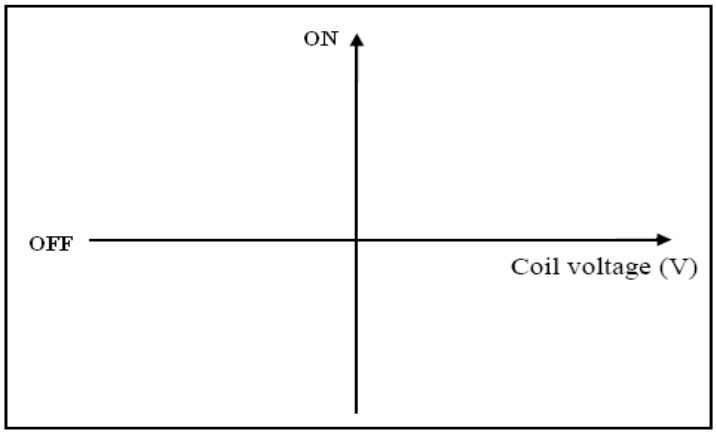

Figure 10: Relationship between coil voltage and relay status

5) Unplug the relay and measure the resistance of its coil using the multimeter. Record the value of resistance.

b- To examine the relay switching speed, do the following steps:

1) Connect the circuit shown in figure 11.

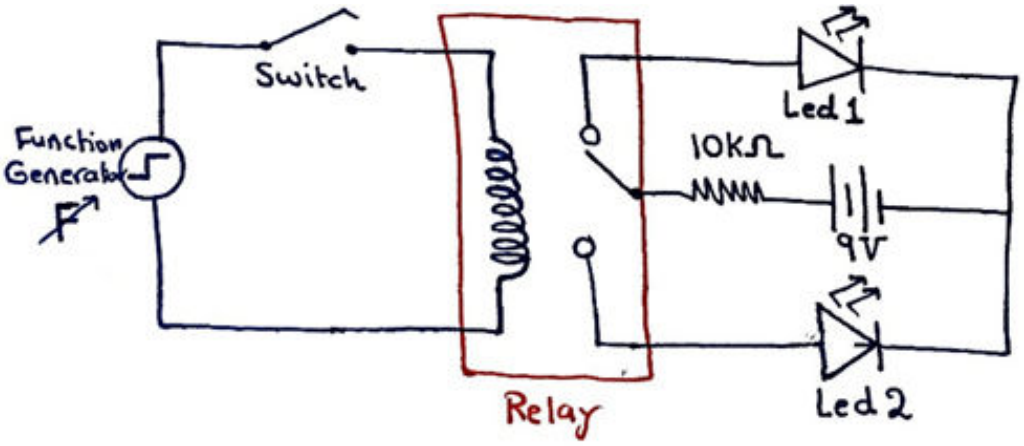

Figure 11: Relay switching speed circuit

2) Use a function generator to generate a square wave of equal duty cycle at a 5V peak value.
3) Increase the frequency of the square signal until the LEDs stop blinking. Record this frequency.

- **Part 2: Transistor Switching**

a- To examine 2N2222 transistor as a switch, do the following:

1) Connect the circuit shown in figure 12.
2) Calculate the value the required based resistor (R_b).

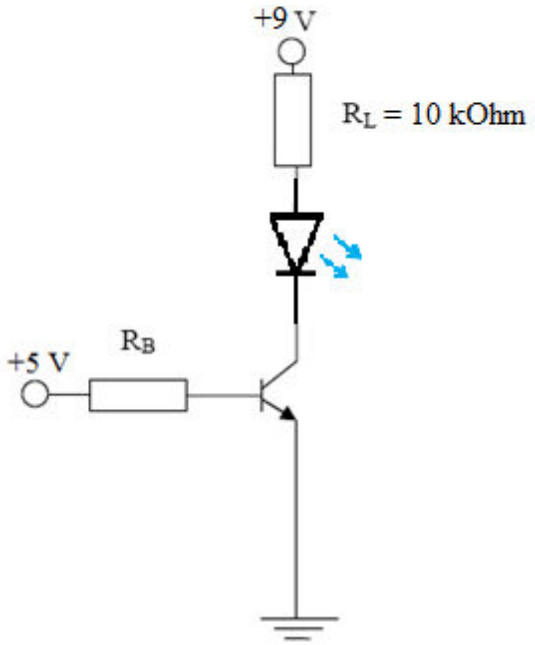

Figure 12: Transistor switching a resistive load

b- To examine the transistor switching speed, do the following steps:
   1) Replace the 5V DC power supply by a function generator to generate a square wave of 5 V peak value.
   2) Connect the oscilloscope to the collector of the BJT transistor and observe the output signal.
   3) Increase the frequency of the function generator until the square wave signal at the output disappears. Record the frequency of the signal at this point.

Discussion and Conclusions

1- How many terminals does the relay have? Identify the function of each terminal.
2- What is the shape of "the relationship between coil voltage and relay status" curve? And what is this phenomenon called?
3- State the main advantages and disadvantages of using a transistor as a switch compared to a relay?
4- Why did the signal disappear at the output of the transistor in part 2.b?