

ACTIVITY

Aim

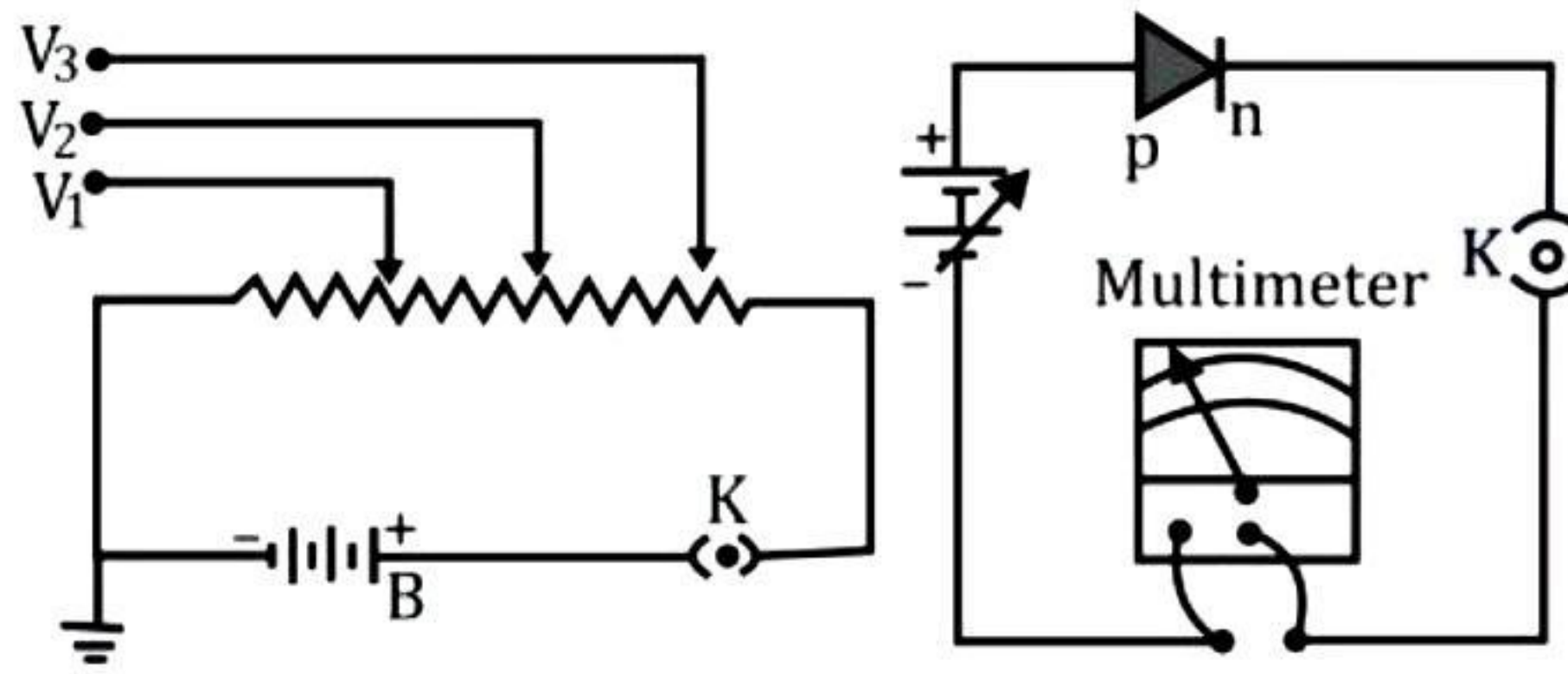
Use of multimeter to see the unidirectional flow of current in case of a diode and an LED and check whether a given electronic component (e.g., diode) is in working order.

MATERIAL REQUIRED

Given transistor, key, multimeter, connecting wires, LED, IC (7408), p-n junction diode, battery, resistance box.

PROCEDURE

1. To identify the base, observe the legs of the transistor. The collector lead will be found to be separated from the other two legs, which are quite close to each other.
2. Connect a battery and rheostat. Take a multimeter and connect it in series with the circuit. Set the multimeter in the current measuring mode. Remember that the 'common' terminal (–) is considered positive and the positive terminal (+) is considered negative.
3. Pass maximum potential V_3 in the collector. For potential V_1 and V_2 through the other two leads respectively, interchange the leads, and observe again. If conduction does not occur in either case, then the collector is n-type, and the transistor is *n-p-n* type. So, the collector is forward-biased.
4. If the transistor conducts in one case and not in the other, the collector is p-type, and the transistor is *p-n-p* type. So, the collector is reverse-biased. The lead has higher potential (V_1 or V_2) is the base. The emitter is forward biased in this case, so conduction occurs.
5. Pass minimum potential V_1 through collector lead, while the other two leads are given potential V_2 and V_3 . Again, check whether conduction occurs in this arrangement by interchanging the leads. If no conduction occurs in either case, then the collector is of n-type and the transistor is *n-p-n* type. The collector is forward-biased. If the transistor conducts in one case and not in the other, then the transistor is *p-n-p* type.
6. The collector is reverse-biased. In conducting position, the lead having smaller potential is the base. For identifying diodes and LEDs, remember that conduction in them occurs only when they are forward-biased.
7. Complete the circuit of the given device by connecting it with the battery key and multimeter. Adjust the multimeter in *dc* multimeter mode.
8. Plug in the key. The multimeter will show deflection only when the diode or LED is connected in forward bias. To check whether a given electronic component is in proper working order, we keep the following objectives in mind:
 - (i) In forward bias, low resistance is offered by a diode. It offers extremely high resistance in reverse bias. So set the multimeter in resistance mode and observe the deflection of the needle in forward-bias as well as reverse bias.



- (ii) For the transistor, identify the three terminals. Connect the multimeter leads in resistance mode across E and B both forward bias and reverse bias. If there is a huge difference in conduction in both cases, it is functioning properly. Check the B and C terminals also in the same manner.

RESULT

The current flow direction in a regular diode and an LED was examined. The functionality of the provided electronic component was verified.

PRECAUTION

1. Ensure that the leads of any component are thoroughly cleaned when measuring its resistance.
2. Exercise caution when utilizing the selector switch on the multimeter for different measuring modes.

VIVA- VOCE

Q 1. What are the advantages of using integrated circuits?

- Ans.**
- (i) They contain a complete electronic circuit having transistors, diode, resistors, and capacitors, and occupy a small space. Hence, the size of instruments and appliances may be reduced to a very large extent.
 - (ii) ICs may be produced in large numbers easily, which not only reduces the cost but also the time of production of equipment.
 - (iii) ICs for special purposes may be prepared easily.

Q 2. What is the difference between an IC and a chip?

- Ans.** There is no difference. Both are the names of the same component.

Q 3. How will you identify an electronic component if it has two pins?

- Ans.**
- (i) If it passes current in both directions, it is a resistor.
 - (ii) If it does not pass a direct current at all, it is a capacitor.
 - (iii) If it passes electric current in one direction only without emitting any light, it is a diode.
 - (iv) If it passes current in one direction only and gives light also, it is an LED.

Q 4. What do you mean by diode?

- Ans.** It is a two terminals device that conducts when it is forward biased and does not conduct when it is reversed biased. It does not emit light while an electric current is passed through it.

Q 5. What is a resistor?

- Ans.** It is a two terminals device that conducts whether it is in forward biased, or reverses biased Alternating current can also be passed through it.