ACTIVITY

AIM

To identify a diode, an LED, a transistor, an IC, a resistor, and a capacitor from a mixed collection of such items.

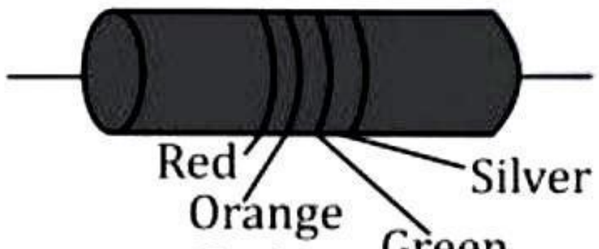
MATERIAL REQUIRED

A collection of a diode, an LED, a transistor, an IC, a resistor, a capacitor, and a multimeter.

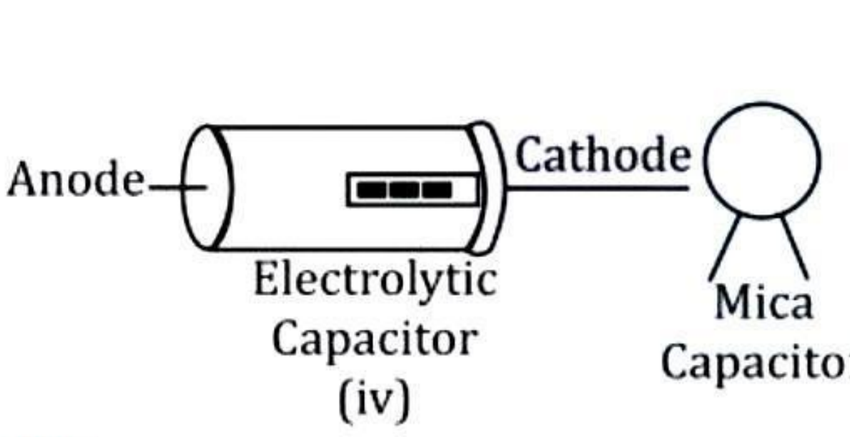
DIAGRAM

Junction Diode
(i)

LED
(ii)

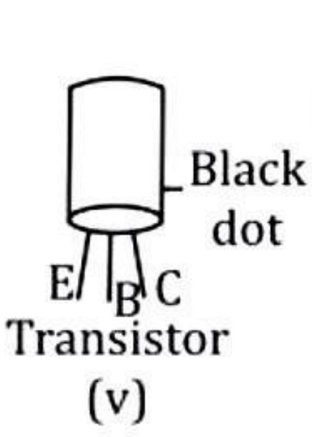


(iii)

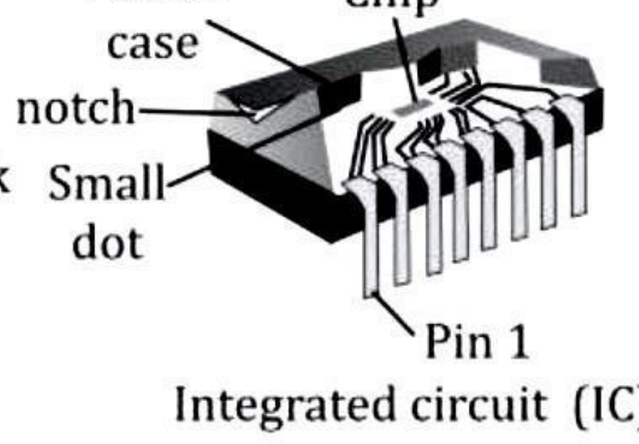


Electrolytic Capacitor
(iv)

Mica Capacitor



Transistor
(v)



Integrated circuit (IC)

THEORY

For the identification of different items from a collection, we have to consider both, their appearance an work.

1. **A diode:** A diode is a semiconducting device that has two terminals. It conducts only when it is forward-biased, and it does not conduct when reverse-biased.
2. **A light-emitting diode (LED):** It is a two terminals device, which gives out light when electric currents pass through it. A diode and a LED both allow the flow of current in one direction only.
3. **A resistor:** It is also a two terminals device. It conducts direct current and alternating current. A resistor can conduct equally even when the terminals of the battery connected across it are reversed.
4. **A capacitor:** It is also a two terminals device, but it does not allow direct current (dc) to flow through it but stores some charge when dc voltage is applied. It conducts alternating currents.
5. **A transistor:** It is a three terminals device (emitter, base, and collector). It has three legs so that it may be identified by appearance only.
6. **An IC (integrated circuit):** In integrated circuits, many circuits are integrated into one chip. IC_s are obtained by a complex procedure involving diffusion, oxidation, photolithography, metallization, etc. It is a multiterminal component. Most IC packages have a flat back. The tips of its legs are thinner than the tops. IC is the component that has a flat back, and a large number of legs, made of flat metal strips.

PROCEDURE

1. Examine the physical characteristics of the component.
2. A component with two terminals may be identified as a resistor, capacitor, diode, or LED.
3. Check for color bands; if there are three typical color bands followed by a silver or gold band, the component is a resistor.
4. Connect the multimeter terminals to the component terminals and observe the multimeter deflection while keeping the multimeter knob in resistance mode.
5. If the multimeter indicates deflection, the component may be a resistor, diode, or LED.
6. If the deflection is accompanied by the emission of light, the component is an LED.
7. If no light is emitted, interchange the multimeter terminals connected to the component.
8. If the component still produces deflection in the multimeter, then it is a resistor.
9. If the multimeter pointer deflects in one direction but not in the opposite direction, and there is no light emission, then the component is a diode.
10. If the multimeter shows no deflection when its terminals are connected to the component in either direction, the component is a capacitor.

RESULT

All the items in the mixed collection have been identified and the result may be summed up in the table given below.

Table For Identification of Components with The Help of Terminals

S.No.	No. of terminals /legs	Devices
1.	More than three	IC
2.	Three	Transistor
3.	Two	Diode, LED, Resistor, and Capacitor

Table For Identification of Components with The Help Of Current Flow

S.No.	No. of terminals /legs	No. of terminals /legs
1.	Unidirectional with no light emission	Diode
2.	Unidirectional with light emission	LED
3.	Current in both directions (steady)	Resistor
4.	No flow of direct current in any way	Capacitor

PRECAUTIONS

1. Connections should be clean and tight.
2. Strong current should not be passed through the components.
3. Polarity should be reversed for identifying the items, e.g., diode, LED, etc.
4. Students must handle the multimeter carefully since it is very sensitive.

SOURCES OF ERROR

1. Multimeter shows zero resistance on touching its metal leads. If it does not show zero resistance, bring the pointer to zero using the zero-adjustment knob on the multimeter. If zero adjustment is not done, the resistance measurement will not be true.
2. While checking resistance, if the metal ends of multimeter leads are touched by hands, body resistance in parallel with the component resistance affects the value of the resistance.

VIVA- VOCE

Q 1. What do you mean by p-n-p or n-p-n transistor?

Ans. If a very thin layer of n-type semiconductor is sandwiched between two relatively thicker layers of p-type semiconductors, it forms a transistor called p-n-p transistor.If a very thin layer of p-type semiconductor is sandwiched between two comparatively thicker layers of n-type semiconductors, it forms a n-p-n transistor.

Q 2. What is an LED?

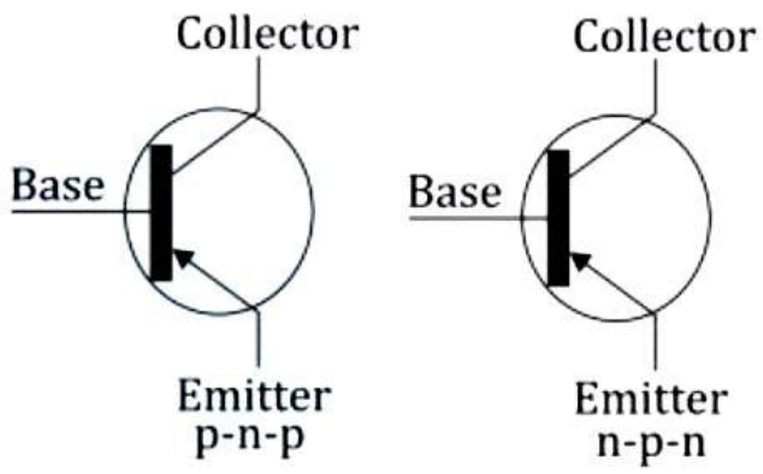
Ans. LED is a light-emitting diode which emits light when a current passes through it.

Q 3. Why does an LED emit light?

Ans. When LED is forward-biased, energy is released in the form of light at the junction due to the re-combination of holes and electrons.

Q 4. Can you draw the symbols of two types of transistors commonly used?

Ans. Yes.



Q 5. Name some other types of diodes.

Ans. Other types of diodes are Zener diode, solar cells, etc.

Q 6. What are the applications of a transistor?

Ans. The transistor can be used as an amplifier, as an oscillator, and as a switch in switching circuits.

Q 7. How many terminals are there in a transistor?

Ans. Three.

Q 8. Name the three terminals of a transistor.

Ans. The terminals of a transistor are called the emitter, base, and collector.

Q 9. Name the three types of possible configurations in transistors.

Ans. **(i)** Common emitter,
(ii) Common base and
(iii) Common collector configuration.

Q 10. What do you mean by an IC?

Ans. IC means an integrated circuit, in which circuit components like diodes, transistors, resistors, and capacitors are put together in a miniatured form on a silicon wafer.