

AIM :

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

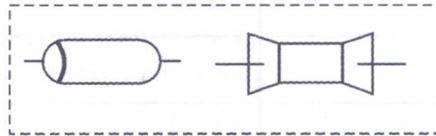
APPARATUS :

Multimeter, LED, transistor, an IC, a resistor and a capacitor.

THEORY :

If we have to identify these items, the appearance and working of each item will have to be considered. Let us discuss each one separately.

1. **DIODE :** It is a two terminal device, it conducts when forward biased and does not conduct when reverse biased. It is made by joining a p-type semiconductor to n-type, thereby making a junction.

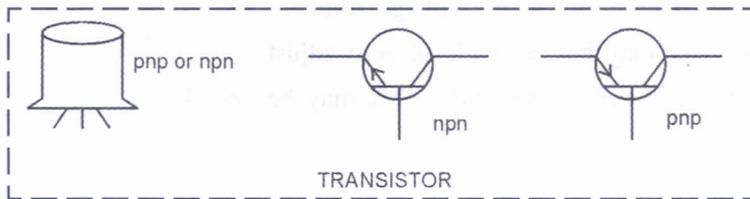


DIODES

2. **LED (Light emitting diode) :** It is a diode made of special materials due to which when current passes through it, energy is converted in visible region of light and so it glows when current passes, and so it is called Light Emitted Diode.

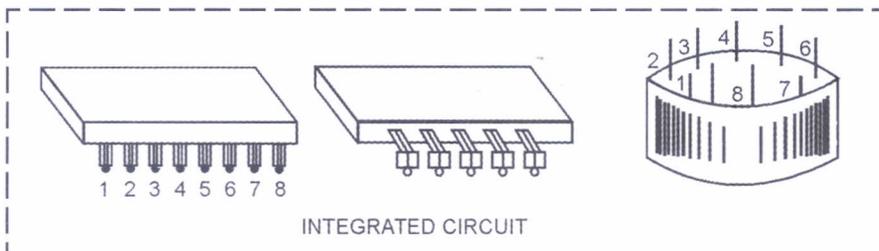


3. **TRANSISTOR :** It is a three terminal semiconductor device. The terminals are named as emitter, base and collector. Transistor is of two types npn and pnp.



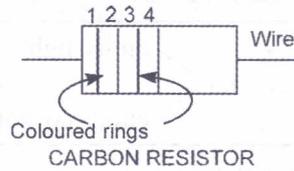
TRANSISTOR

4. **IC (Integrated Circuit) :** An IC is a multi-terminal device in the form of a chip.

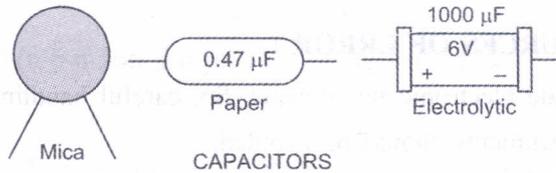


INTEGRATED CIRCUIT

5. **RESISTOR** : It is a two terminal device and conducts under any condition and even when operated with A.C. voltage. There are various types of resistors such as carbon resistors



6. **CAPACITOR** : It is also a two terminal device; it does not conduct when D.C. voltage is applied. However, it conducts when A.C. voltage is passed.



PROCEDURE :

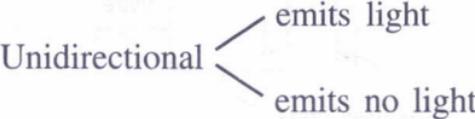
You are given mixed collection of items. So, procedure to detect the devices separately should be followed carefully.

- (i) Look at the mixed collection. Pick the one with maximum number of terminals; say more than three. This is IC.
- (ii) Pick the one with three pins having a number on it. It is a transistor.
- (iii) Make a series connection with a battery eliminator, a key and a multimeter in the range of milliamperes. Switch on the source and note the milliammeter readings. If the pointer shows deflection when a voltage is applied in one direction and does not show deflection when voltage is applied in opposite direction and also there is no emission of light, then the item is a diode. On the device there will be a ring made, that represents p-terminal of diode.
- (iv) If the above observations are associated with the emission of light, it is a L.E.D. (Light emitting diode).
- (v) If the device has two terminal and 3 or 4 coloured rings then this is a carbon resistor and the pointer shows a deflection whether current flows in any direction.
- (vi) If the pointer does not move whether the voltage is applied in any direction, it is a capacitor.

Table for components

S. No.	Number of legs	Device
1	More than 3	IC
2	3	Transistor
3	2	Capacitor, diode or resistor

Table to detect device

Sl.No.	Possible current flow	Device
1	Unidirectional 	Diode LED
2	Both directions flow	Resistor
3	Initially high but decays to zero	Capacitor

PRECAUTIONS AND SOURCES OF ERROR :

- (i) All are very delicate electronic instruments. So, careful handling should be followed.
- (ii) Heating of the instruments should be avoided.
- (iii) The zero of the multimeter should be carefully adjusted.
- (iv) The multimeter may not be of proper range.
- (v) The devices may be overheated due to flow of large current through it.