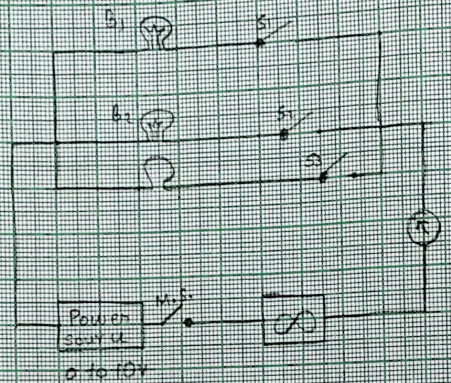
ACTIVITIES

CIRCUIT DIAGRAM



AIM

To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source

APPARATUS AND MATERIALS

Materials: three bulbs (6V, 1W) each, fuse of 0.6 A, main switch a power supply (battery eliminator), three (on/off) switches, flexible connecting wire with red and black plastic coverings, a fuse wire

THEORY

Electricity supplied to us for domestic purposes is 220 V A.C and 50 Hz. The household circuit, all appliances are connected in "parallel" with mains. The switches are connected in series with each appliance in live wire. 5A switches are required for normal appliances like, bulbs, fluorescent tubes, fans etc. 15A sockets and switches are required for heavy load appliances like, refrigerator, air conditioner, geyser, hot plate etc. All appliances must have three wires called live, neutral and the earth, Total power consumption 'P' at a time,

$$P = P_1 + P_2 + P_3 + \ldots\ldots$$

PROCEDURE

1. Connect the bulbs B_1, B_2 and B_3 in series with switches S_1, S_2 and S_3 respectively and connect each set of B-S in parallel

with each other

2. Connect main supply to a step-down transformer (battery eliminator) to get required voltage from 0 to 10 V (0, 2, 4, 6, 8 and 10V).

3. Connect the mains fuse M.S in series with the power supply (battery eliminator)

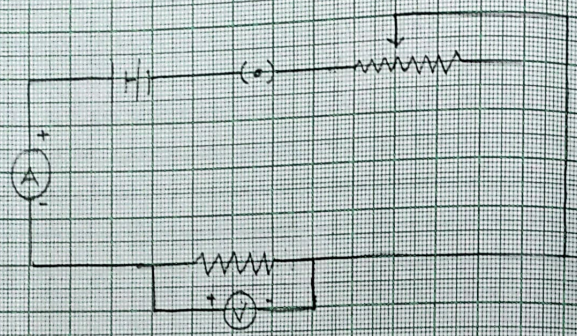
4. Connect an A.C ammeter in series with the D.S set

5. Connect live end of power supply to one end of D.S set

6. Check the circuit ones again to ensure that house hold circuit is completed

7. Gradually increase the current to 0.75A, the fuse must burn off at about 0.6A

CIRCUIT DIAGRAM



/ /

AIM

To assemble the components of a given electrical circuit

APPARATUS AND MATERIAL

Apparatus. A voltmeter and an ammeter of appropriate range, a battery, a rheostat, oneway key.

Material. An unknown resistance or resistance coil, connecting wires, a piece of sand paper

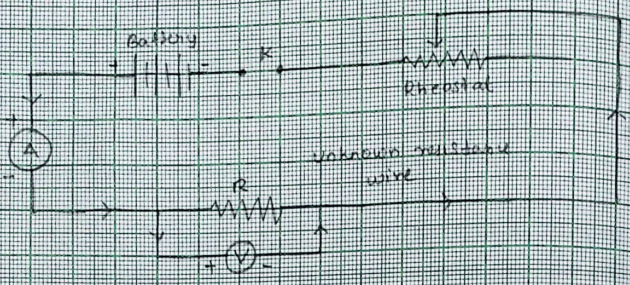
PROCEDURE

1. Connect the components (Resistors, inductors etc) in series with each other as shown in diagram and then in series with the battery
2. Connect the ammeter in series with the circuit, to measure the current
3. Connect the voltmeter in parallel to the resistor, to measure the potential difference
4. Connect the switch in series with the battery
5. Assembly of the electrical components in electric circuit is complete

UTILITY

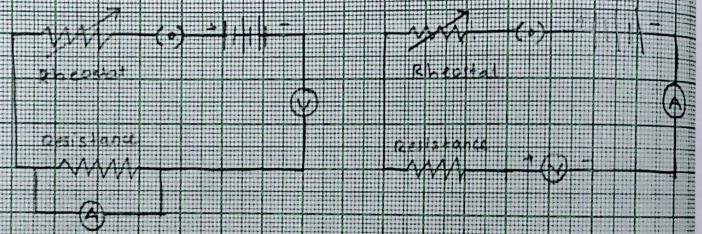
It is used for measuring an unknown resistance

CIRCUIT DIAGRAM



If the circuit is not working, it can have many errors

(i) Broken fuse wire
(ii) Loose connection
(iii) Exhausted battery
(iv) Improper connection of terminals



(i) (ii)

/ /

AIM

To draw the diagram of a given open circuit comprising at least a battery, resistor/rheostat, key, ammeter and voltmeter. Mark the components that are not connected in proper order and correct the circuit and also the circuit diagram.

APPARATUS AND MATERIAL

A battery eliminator or a battery (0 to 6 V), rheostat, two resistors, one-way key, D.C. ammeter (0-3) A and a D.C voltmeter (0-3) V

THEORY

An open circuit is the combination of primary components of electric circuit in a such a manner that on closing the circuit, no current is drawn from the battery.

PROCEDURE

Ammeter. It should be connected in series with the battery eliminator

Voltmeter. It should be connected in parallel to the resistor

Rheostat. It should be connected in series (in place of resistance coil) with the battery eliminator

Resistance coil. It should be connected in parallel (in place of rheostat)

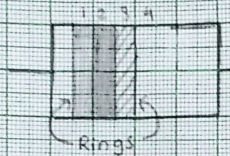
One way key. It should be connected in series to the battery eliminator

/ /

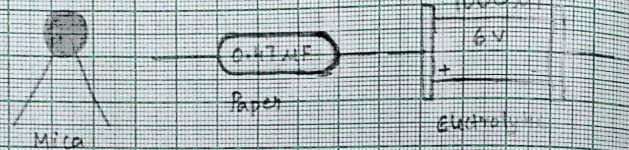
PRECAUTIONS

1. Draw the given open circuit in auxillary notebook
2. Check which components are connected in proper order and which are not
3. Take out the key plug before connecting the components.
4. Always connect the ammeter in series

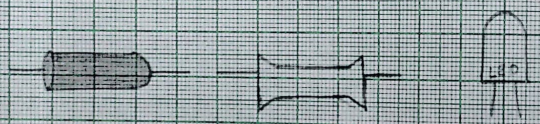
The common marks to be identified are:



a) Carbon resistor



b) Capacitors



c) Diodes

/ /

AIM

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

APPARATUS AND MATERIAL

Apparatus. Multimeter

Material. Above mixed collection of items

THEORY

For identification, appearance and working of each item will have to be considered

1. A diode is a two-terminal device. It conducts when forward biased and does not conduct when reverse biased. It does not emit light while conducting. Hence, it does not glow
2. A LED (Light emitting diode) it also a two-terminal device. It also conduct when forward biased and does not conduct when reverse biased. It emits light while conducting. Hence it glows
3. A resistor is a two-terminal device. It conducts when either forward biased or reverse biased. (In fact there is no forward or reverse bias for a resistor). It conduct even when operated with A.C voltage
4. A capacitor is also a two-terminal device. It does not conduct when either forward biased or reversed biased. When a capacitor is connected to a D.C source, then multimeter shows full scale current initially but it decay to zero quickly. It is because that initially a capacitor draw a charge

OBSERVATION

Item	Number of terminals	Name of device	No. of obs	Passing current (Yes/No)	Name of device
1	Two	Capacitor Diode, LED or resistor	2	Unidirectional with no light	Diode
			3	Unidirectional emits light	LED
			4	Both directions (Ohmic)	Resistor
			5	Initially high but drops to zero	Capacitor

PROCEDURE

1. If the item has two terminals, it may be diode, a LED, a resistor or a capacitor.

   In order to differentiate proceed as ahead:

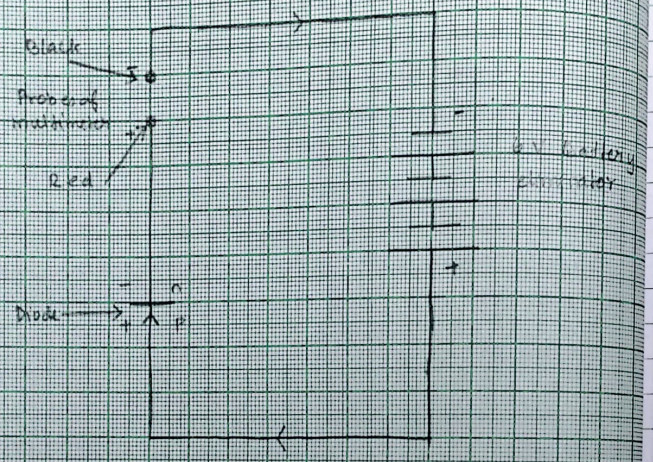
   Connect the battery eliminator, reversing key, the items to be identified and the multimeter. Switch on the circuit and carefully observe the movement of the pointer of the multimeter.

   i) If pointer moves when voltage is applied in one way and does not move when reversed and there is no light emission, the item is a diode.

   ii) If pointer moves when voltage is applied in one way and does not move when reversed and there is light emission, the item is a LED.

   iii) If pointer moves when voltage is applied in one way and also when reversed, the item is a resistor.

   iv) If pointer does not move when voltage is applied in one way and also when reversed, the item is a capacitor.



AIM

To use a multimeter to:

a) see the unidirectional flow of current in case of a diode and an LED and

b) checks whether a given electronic component is in working order.

APPARATUS

A multimeter, a diode and an LED

THEORY

a) A diode or a LED conducts only when forward biased and in reverse biasing, there is no flow of current.

b) When a diode is in working order, it will allow the current to flow in one direction, when forward biased

PROCEDURE

1. Use the selector switch and put the multimeter in ohm range (Ω)
2. Insert the metallic end of the ~~the~~ bulk lead in common terminal of the multimeter and that of the red in the terminal marked P

a) Unidirectional flow of current

Case of junction diode

1. Connect the +ve marked end of the diode to +ve terminal of a 6V variable D.C battery adjusted to minimum voltage
2. Select the D.C current at 10 mA range by using the selector switch. Insert one the metallic end of probe in terminal P(+) and

the black metallic end into the terminal marked common

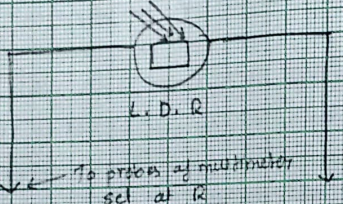
3 Connect the other metallic end of red probe to the free end of the diode and the metallic end of black probe into the -ve terminal of the battery eliminator and read the value of current by varying the output of the eliminator. Since the diode is forward biased, it allows the current to pass

4. Now reverse the terminals of the diode such that the end marked -ve is at higher potential and the one marked + is at lower potential. Again observe the current in multimeter on the appropriate D.C milliampere scale. No current reading in the multimeter would indicate that the diode allows the flow of current in one direction only ie, the current is unidirectional in a diode.

5 Now replace the diode by the LED and repeat the steps to establish that an LED also allows the flow of current only when it is forward biased as well as emits light.

b) Checking whether diode, transistor or IC is in working order

A diode will conduct only in one direction i.e, first connect the end of diode to the two metal ends of the probes and reverse the connecting points. If it conducts in one case, then diode is in working order. If conducts in both case or does not conduct in both case, then it is damaged



AIM

To study effect of intensity of light (by varying distance of the source) on an LDR

APPARATUS

Light source, light dependent resistor (L.D.R.s) of different variety, a multimeter (or meter bridge), a source of intense light (a lamp bulb with battery eliminator) and a convex lens.

Light Dependent Resistor

The light dependent resistance are the devices for detecting and measuring electromagnetic waves (light etc.) Its working is based upon the principle of variation of the photoconductivity when radiation is incident upon it and absorbed by it.

A light dependent resistor is prepared from cadmium sulphide. Its resistance depends upon the intensity and duration of light incident on it.

A good quality L.D.R shows a resistance variation from 1M-Ω in complete darkness to about 10-Ω in full day light. The intensity of light decreases inversely with increase the square of distance.

PROCEDURE

1. Turn the selector switch and set it on R for the measurement of resistance in multimeter.
2. Plug the metallic ends of black probe in terminal marked common in multimeter and that of red in terminal marked as P (or +).

Serial No. of obs (1)	Distance of source from LDR d(cm) (2)	Resistance of LDR R (ohm) (3)	Reciprocal of Resistance 1/R (ohm^{-1}) (4)
1	2		
2	4		
3	6		
4	8		
5	10		

Short the other metallic ends and adjust the 'R adjusting' to get full scale deflection readings at zero ohm in the meter.

3. Touch the metallic probes to the two metal ends of the LDR and read the value of resistance when the source is kept at a distance of 2cm, fixing the source of light in a stand and keeping the LDR vertically below it.

i) Moving the source to 4 cm distance from the LDR and

ii) Moving the source to 6, 8 and 10 cm from L.D.R. and repeating observation three more times

CONCLUSION

When the distance between light source and LDR increase the resistance of LDR decrease.

Note: same activity can be done by varying the exposure time in steps for same source of light, same LDR and for same distance.

PRECAUTIONS

1. No stray light should fall on the LDR. It is better to work in a dark room.
2. Connect L.D.R carefully to the voltage source.