3. Differentiate between conductors & insulators.

Ans:

Conductors	Insulators
* Those substances which have very low resistance are called as conductors.	Those substances which have extremely high resistance is called insulators.
* Current can flow easily through conductors.	Current can not flow through insulators.
* Copper, Iron etc.	Rubber, wood etc.

4. State the precautions to be taken while using the electricity.

Ans - * Electric switches & sockets should be fitted at a height at which small children cannot reach & put pins or nails inside. Pull a plug. wires should not be pulled while cleaning removing a plug from its socket.

* Before cleaning an electrical appliances it should be switched off & its plug removed from the socket.

* One's hands should be dry while handling an electrical appliance & as far as possible, one should use footwear with rubber soles. As rubber is an insulator, it prevents the current from flowing through our body.

thereby protecting it.

* If a person gets an electric shock, you should not tuch that person. You should switch off the main switch if the switch is too far or you do not know where it is located, then you should remove the plug from the socket if possible. If not then you should use a wodden pole to push that person away from the electric wire.

Q. Give Scientific reasons for:-

a. Connecting wires in a circuit are made up of copper & Aluminium.

Ans-* Copper & Aluminium are metals having very low resistance.

* This helps the electric current to flow through them easily

* Therefore copper & aluminium are used to make wires in a circuit.

---

b. Wood & glass are good insulators.

Ans-* Wood & glass have extremely high resistance.

* The electric current cannot flow through them.

* Therefore wood & glass are good insulators.

c. The materials used in fuse have a specific melting point.

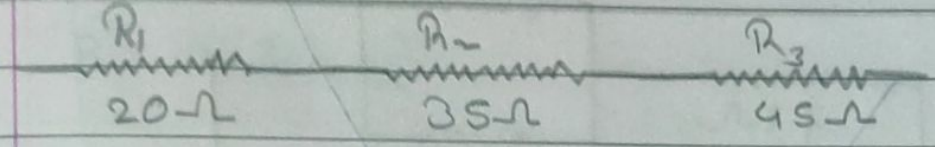
Ans- * Fuse wires is connect in series to the electrical appli-ces.

* If for some reasons the current in the circuit increases excessivdy, the fuse wire gets heated up & melts.

* The circuit gets broken & the flow of current stops, thus protecting the appliances.

Q.9 Solve the following problem.

A: Find the resultant resistance :—

1) 

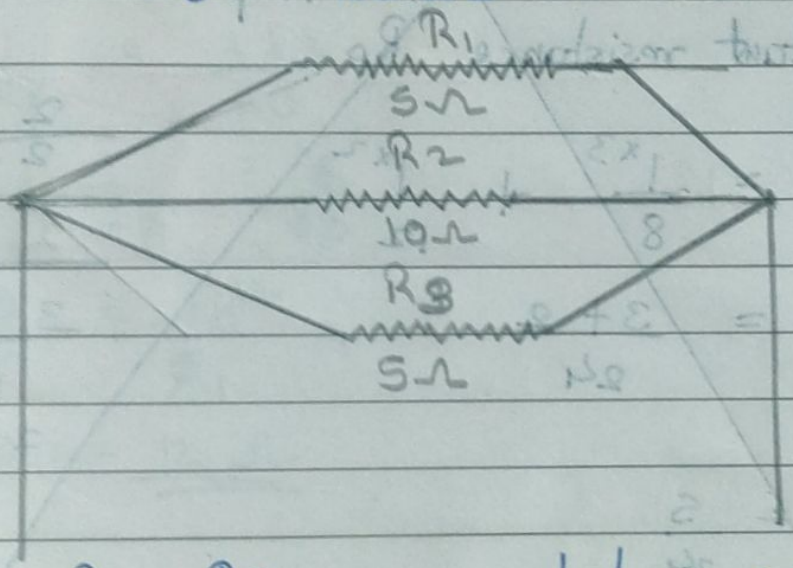
$= R_S$?

$\because R_1, R_2$ & R_3 are connected in series

$\therefore$ the resultant resistance R_S,

$R_S = R_1 + R_2 + R_3 = 20\,\Omega + 35\,\Omega + 45\,\Omega$

$\therefore \therefore R_S = 100\,\Omega$

2) 

$\because R_1, R_2, R_3$ are connected in parallel

$\therefore \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

$\therefore \frac{1}{R_p} = \frac{1^{\times 2}}{5} + \frac{1^{\times 2}}{10} + \frac{1^{\times 2}}{5}$

$\therefore \frac{1}{R_p} = \frac{2 + 1 + 2}{10}$

$\therefore \frac{1}{R_p} = \frac{5}{10}$

$\therefore R_p = \frac{10}{5_1}^{2}$ $\quad R_p = \underline{2\,\Omega}$

2	5, 10, 5
5	5, 5, 5
	1, 1, 1
	= 10

3. Calculate the resultant resistance when the
→ 2 resistance of 20Ω and 30Ω are connect
in series and parallel
→ $R_1 = 20\Omega$, $R_2 = 30\Omega$

i) Series

$R_S = R_1 + R_2 + R_3$

$R_S = 20 + 30$

$R_S = 50\Omega$

ii) Parallel

$$\frac{1}{R_P} = \frac{1}{20} + \frac{1}{30}$$

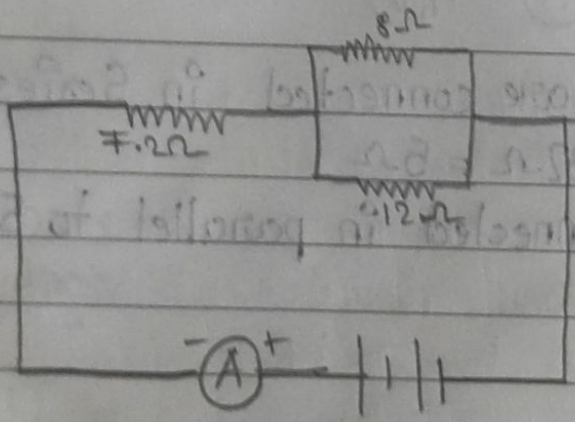
$$\frac{1}{R_P} = \frac{3+2}{60}$$

$$\frac{1}{R_P} = \frac{5}{60}$$

$$R_P = \frac{60^{12}}{5_1}$$

$$R_P = 12\Omega$$

4.



8Ω & 12Ω are connected parallel ∴ the resultant resistance R_P

$$\frac{1}{R_P} = \frac{1}{8} + \frac{1}{12}$$

$$\frac{1}{R_P} = \frac{3+2}{24}$$

$$\frac{1}{R_P} = \frac{5}{24}$$

$$R_P = 4.8\Omega$$

RP & 7.2Ω are connected in Series

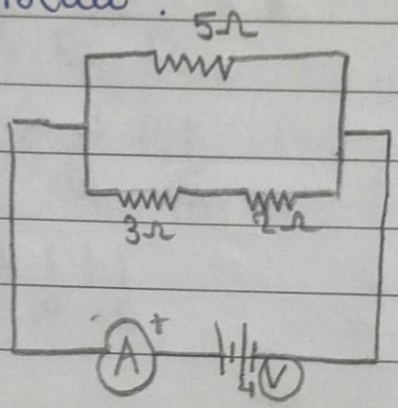
∵ The resultant resistance

$= 4.8\Omega + 7.2\Omega$

$= 12.0\Omega$

$= 12\Omega$

5] Fund the total I & R in the given circuit.



3Ω and 2Ω are connected in Series

$\therefore R_S = 3\Omega + 2\Omega = \underline{5\Omega}$

$R_S = 5\Omega$ is connected in parallel to 5Ω

$$\therefore \frac{1}{RP} = \frac{1}{5} + \frac{1}{5}$$

$$\frac{1}{RP} = \frac{1+1}{5}$$

$$\therefore \frac{1}{RP} = \frac{2}{5}$$

$$\therefore R_P = \frac{5}{2}$$

$$\therefore R_P = 2.5\Omega$$

$$\frac{V}{I} = R \text{ - ohm's law}$$

M T W T F S S

Page No.:

Date:

YOUVA

$V = 4V, R = 2.5\Omega$

$$\therefore I = \frac{V}{R} = \frac{4}{2.5} = \frac{40}{25} = 1.6A$$

$$5\overline{)8}\ (1.6$$
$$\underline{5}$$
$$30$$
$$\underline{30}$$
$$0$$

6) A potential difference ~~of two~~ ~~three~~ (V) of 250 V is applied across a resistance (R) of 1000Ω in an electricion. Find the current (I) flowing through it?

Ans $V = 250V$

$R = 1000V$

$I = ?$

$\frac{V}{I} = R$ - ohms law

$\therefore V = IR$

$\frac{1250}{1000} = I$

$\frac{1}{4}$

$\therefore I = \frac{1}{4}$

$\therefore 0.25A$

b. When two resistors are connected in series, their effective resistance is 80 Ω. When they are connected in parallel, their effective resistance is 20 Ω. What are the values of the two resistors?

Ans- Let the two Resistors be R_1 & R_2

$R_1 + R_2 = 80$

$\therefore R_1 = 80 - R_2 \quad - (1)$

$$\frac{1}{R_1} \times R_2 + \frac{1}{R_2} \times R_1 = \frac{1}{20}$$

$$\frac{R_2 + R_1}{R_1 R_2} = \frac{1}{20}$$

$$\frac{80}{(80 - R_2)\, R_2} = \frac{1}{20}$$

$$\frac{80}{80 R_2 - R_2^2} = \frac{1}{20}$$

$$(80 R_2 - R_2^2) = 80 \times 20$$

$$80 R_2 - R_2^2 = 1600$$

$$R_2^2 - 80 R_2 + 1600 = 0$$

$$R_2^2 - 40 R_2 - 40 R_2 + 1600 = 0$$

$R_2(R_2 - 40) - 40(R_2 - 40) = 0$

$\therefore (R_2 - 40)(R_2 - 40) = 0$

$\therefore R_2 - 40 = 0$ or $R_2 = 40\ \Omega$

$\therefore R_1 = 80 - 40$

$\therefore \boxed{R_1 = 40\ \Omega}$

$\therefore$ The two resistors are $40\ \Omega$ & $40\ \Omega$.

(38)
Example: The resistance of the filament in a light bulb is $1000\ \Omega$. If the bulb is fed by a current from a source of potential difference 230 V, how much current will flow through it?

Given: $R = 1000\ \Omega$

$V = 230\ V$

formula: $I = \frac{V}{R}$

$\therefore I = \frac{230\ V}{1000\ \Omega} = 0.23\ A.$

$\therefore$ The current flowing through the filament of the bulb = 0.23 A

Example 3: (35) A current of ~~24~~ 0.24 A flows through a conductor when a potential difference of 24 V is applied between its two ends. What is its resistance?

Given: $V = 24\ V, I = 0.24\ A$

Formula: $R = \frac{V}{I}$

$\therefore I = \frac{24\ V}{0.24\ A}$

$R = 100\ \Omega$

The resistance of the conductor is 100 Ω

Example 4: (38) Determine the current that will flow when a potential difference of 33 V is applied between two ends of an appliance having a resistance of 110 Ω. If the same current is to flow through an appliance having a resistance of 500 Ω, how much potential difference should be applied across its two ends.

Given: $V = 30\ V$ & $R = 110$

In the first case,

$$I = \frac{V}{R} = \frac{33}{110}$$

Current flowing through the ~~applied force~~ appliance $= 0.3\ A$

In the second case

$I = 0.3\ A$, $R = 500\ \Omega$

$V = IR = 0.3 \times 500\ V = 150\ V$.

The required potential difference between its two ends = 150 V.

---

(40) Example:1 Three resistors having resistance of 15 Ω, 3 Ω & 4 Ω are connected in series. What is the effective resistance in the circuit?

Given: $R_1 = 15\ \Omega$, $R_2 = 3\ \Omega$, $R_3 = 4\ \Omega$

Effective resistance $R_s = R_1 + R_2 + R_3 = 15 + 3 + 4 = 22\ \Omega$

∴ The effective resistance in the circuit = 22 Ω

---

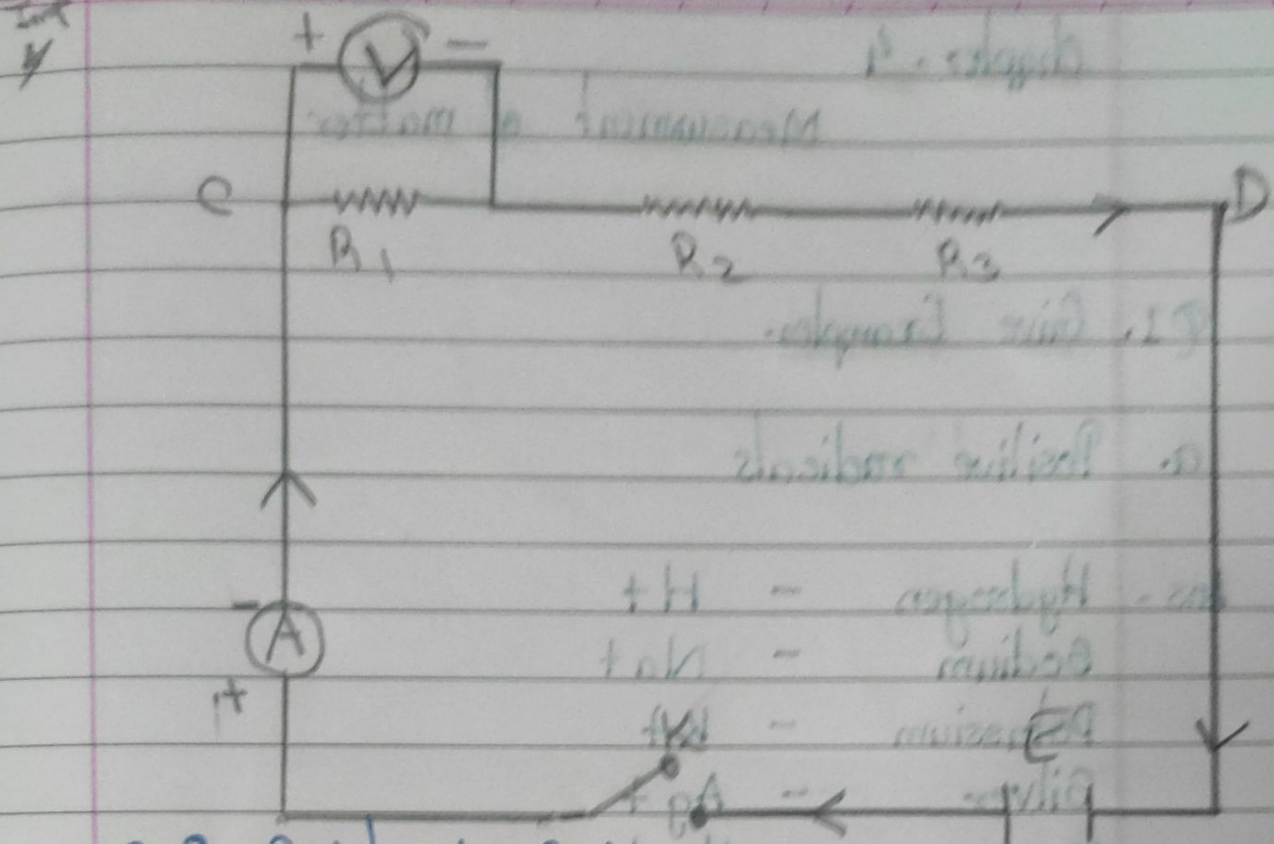
(42) Example:1 Resistors having resistance of 15 Ω, 20 Ω & 10 Ω are connected in parallel. What is the effective resistance in circuit?

Given: $R_1 = 15\ \Omega$, $R_2 = 20\ \Omega$ & $R_3 = 10\ \Omega$

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

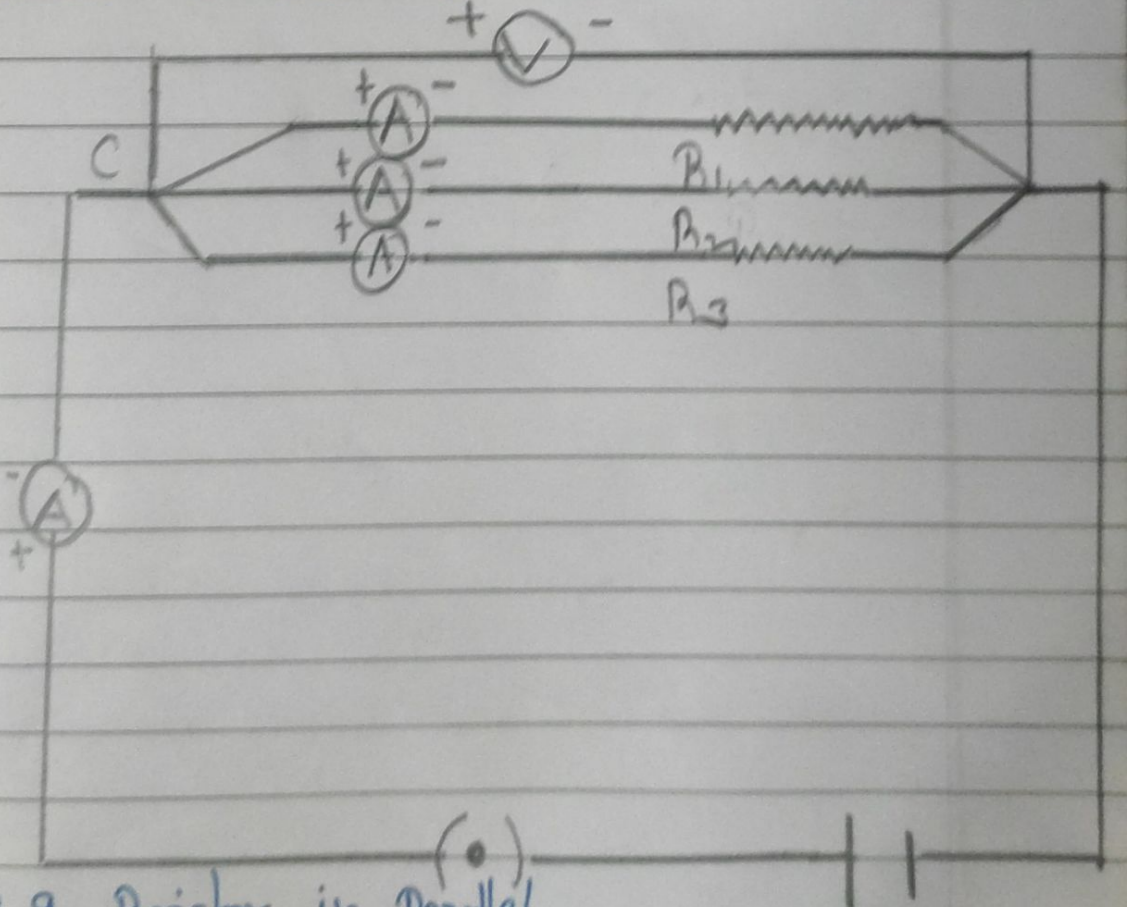
$$\frac{1}{12_p} = \frac{1}{15} + \frac{1}{20} + \frac{1}{10} = \frac{4+3+6}{60} = \frac{13}{60}$$

Draw figures for the following



3.8 Resistor in Series

** Resistor in Parallel :



3.9 Resistor in Parallel.