Date:

"LACTURE"

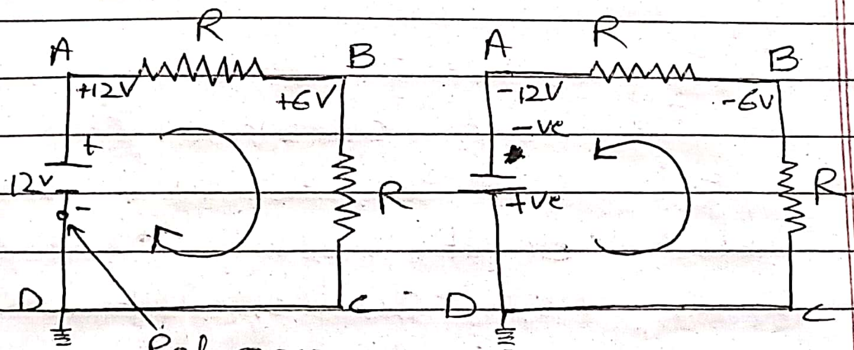
M T W T F S

⇒ APPLIED PHYSIC'S-

Q- ZERO REFERENCE LEVEL=

In order to avoid errors in different measurements in voltage of an electronic circuit. It is essential to select same common points is known as zero reference level.

The point to be selected as reference point can be any point in the circuit and need to be necessarily at zero volt.



Reference Point

$$P.E = Charge + P.D$$

⇒ Reference Point is compulsory to measure Voltage

⇒ DC is a constant magnitude.

⇒ DC is much powerful than ~~mas~~ AC.

Date: ________

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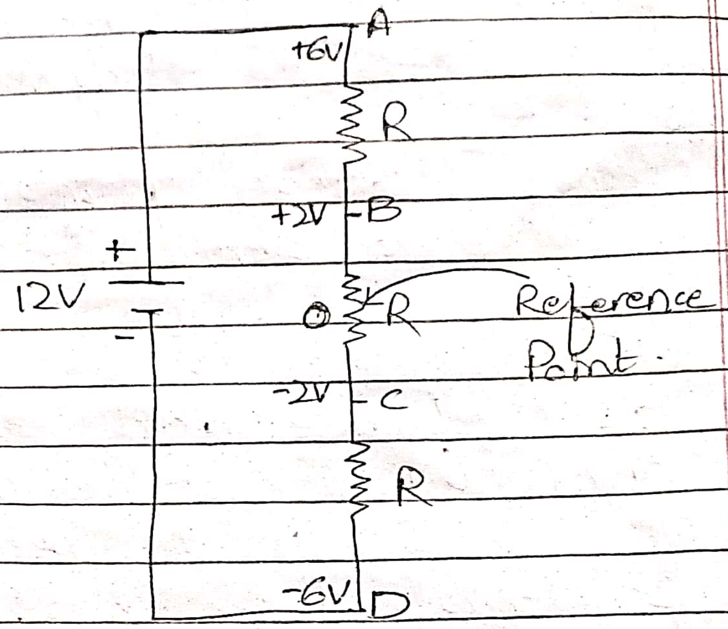
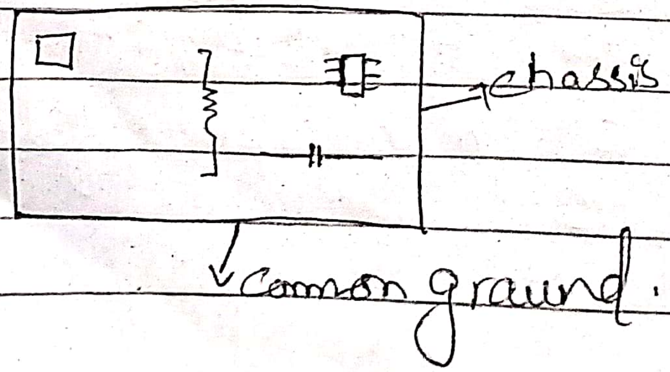
=> Blood is a electrolyte.
=> Current flows due to potential difference.



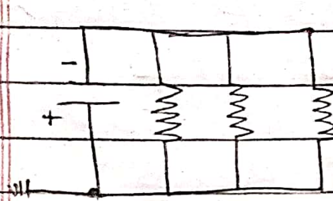
Q= CHASIS GROUND=

Generally electronic component are mounted on conducting metal sheet called chassis or a non conducting plastic board with printed wire. When using chasses, it is common practice to treat the body of chassis itself as common ground.



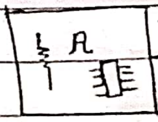
Date: ______ M T W T F S

i) Conducting metal sheet.
ii) Non-conducting plastic board.



PCB = Printed circuit Board

Chassis ground.



→ Common ground

⇒ The conducting metal act as a chassis ground.

⇒ If path is not close the current flows not occour.

⇒ The boundary of plastic board work as chassis ground.

⇒ The energy charge work as a energy carrier from the source of energy is called Potential difference or Voltage.

⇒ The devices which can convert to electric energy is called source of energy.

⇒ The work of source is to give charge a direction.

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Date:

Q- OHM'S LAW-

In circuits energised by DC voltages sources, their exist a definite relationship between the current (I) that flows through resistance (R) and voltages (V) applied across the resistance. This relationship is called ohm's law.

$$I = \frac{V}{R}.$$

Here,

I = current.

V = Voltages.

R = Resistance.

Current here is directly proportional to voltage and inversely proportional to resistance.

Formula Variations for Ohm's Law-

for current-

$$I = V/R$$

for Voltage-

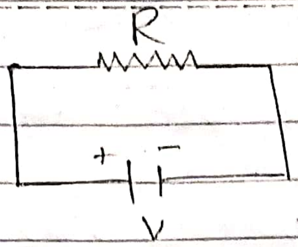
$$V = IR.$$

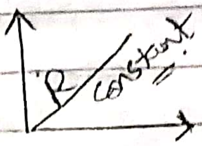
for resistance-

$$R = \frac{V}{I}.$$

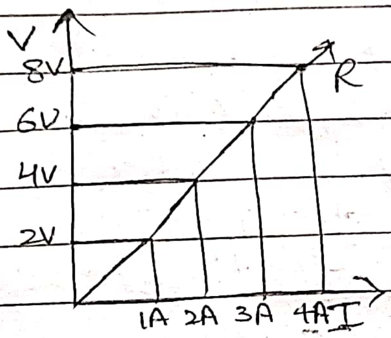
Date:

M T W T F S





Q. Graphical Representation of Ohm's Law.



for resistance,

$$R = \frac{V}{I} \qquad \therefore V = IR.$$

$R = ?$, $V = 4v$, $I = 2A$.

$$R = \frac{V}{I} = \frac{\cancel{4}}{\cancel{2}} = 2\,\Omega.$$

⇒ Material that obey ohm's law are called ohmic material. (filament)

⇒ Materials that don't obey ohm's law are called non-ohmic material: LED Bulb, Semiconductor

Date:

Q= LINEAR RESISTOR=

A resistor whose value remain constant, it does not depend upon applied voltage. The The V-I characteristic of such resistors is a straight line

$V \propto I$

Q= NON- LINEAR RESISTOR=

Resistors in which V and I are not directly proportional to each other. If applied voltage is doubled, the resultant current, is not exactly doubled of its previous value. Such resistors are called Non-Linear.

Q= WORK & POWER=

=> WORK=

Ability to do something is Called work.

=> Power=

Rate of doing work is called Power.

$$P = \frac{W}{T} = \frac{E\,(\text{energy})}{T} = \frac{VIt}{t} = VI$$

In term of Voltage & current

unit = watt.

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So,
we have

$$\boxed{P = VI}$$

and we know $(V = IR)$ in ohms law;

So,

$$P = (IR)\, I$$

$$\boxed{P = I^2R} \text{ (Power loss)}$$

for resistor in series.

AND,

$$I = \frac{V}{R} \qquad \therefore I = \frac{V}{R}$$

$$P = \left(\frac{V}{R}\right)^2 \cdot R \qquad \because P = I^2R$$

$$P = \frac{V^2}{R^2} \cdot R$$

$$\boxed{P = \frac{V^2}{R}}$$

for resistors in Parallel.

Date: 12/01/2023

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LACTURE

⇒ **PHYSIC'S.**

SHORT CIRCUIT:

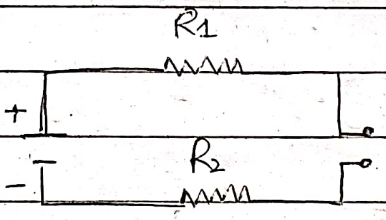
It is a close circuit whose resistance is zero. It is almost negligiable.

OPEN CIRCUIT:

It is a off circuit whose resistance is infinite.

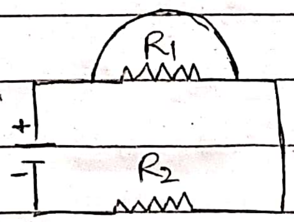
* Resistance of gap is infinite.

"Ref. Book page No-17"



"Open circuit"

⇒ In open circuit voltages appear accross end point or open points.



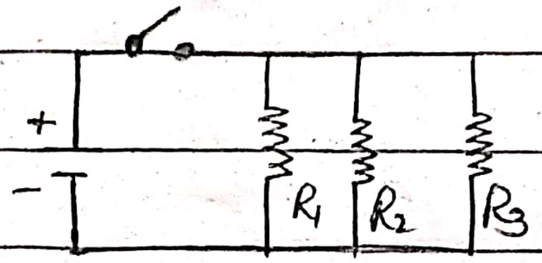
"short circuit"

⇒ In short circuit current passes through the path having low resistance.

SHORT CIRCUIT AND OPEN CIRCUIT IN PARALLEL=

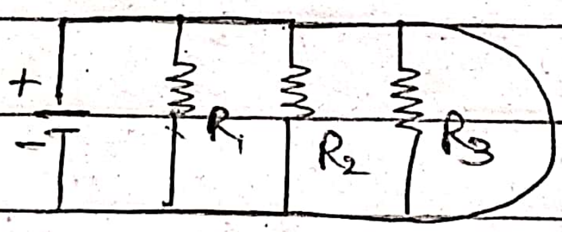
OPEN CIRCUIT IN PARAEL=

We use open circuit in parallel in order to save the connected resistances from breakage or disorder.



SHORT CIRCUIT IN PARALLEL=

We use short circuit in parallel to provide easy path for the flow of current in parallel.



Date:

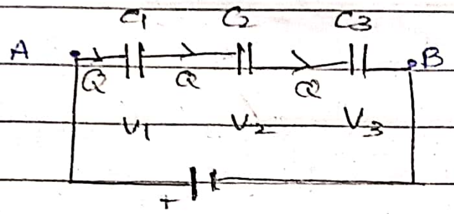
M T W T F S

=> CAPACITANCE -

The ability of capacitor to store electric charge is called capacitance.

Its unit is farad.

=> CAPICITOR IN SERIES -



In series charge remains the same and voltages split.

$$Q = CV$$

and

$$V = Q/C$$

and we know,

$$V = V_1 + V_2 + V_3$$

$$\frac{Q}{C_{eq}} = \frac{Q}{C_1} + \frac{Q}{C_2} + \frac{Q}{C_3} \quad \because V = Q/C$$

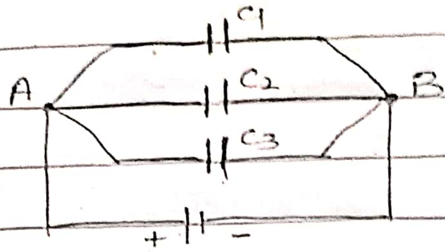
$$\frac{\cancel{Q}}{C_{eq}} = \cancel{Q}\left(\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}\right)$$

$$\boxed{\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}}$$

If we have capacitance in series we add them by reciprocal.

=> CAPACITOR IN PARALLEL=

IN Parallel voltage remains same and charge splits.



$$Q = CV$$

So

$$Q = Q_1 + Q_2 + Q_3$$

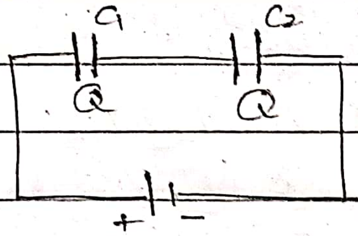
$$C_{eq} V = C_1 V + C_2 V + C_3 V$$

$$C_{eq} \cancel{V} = \cancel{V}(C_1 + C_2 + C_3)$$

$$C_{eq} = C_1 + C_2 + C_3$$

=> TWO CAPACITORS IN SERIES=

As we connect two capacitor in series



we get

$$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2}$$ (Applying Ceq formula)

$$= \frac{C_2 + C_1}{C_1 C_2}$$

Taking reciprocal=

$$C_{eq} = \frac{C_1 C_2}{C_2 + C_1}$$

Date:____ M T W T F S

=> finding Voltages in Series for two capacitors =

$V_1 = ?$

$Q = C_1 V_1$

$\Rightarrow V_1 = \frac{Q}{C_1} = \frac{V C_{eq}}{C_1}$ $\because Q = V C_{eq}$

$= \frac{V}{\cancel{C_1}} \times \frac{\cancel{C_1} C_2}{C_1 + C_2}$ $\because$ formula of (C_{eq})

$$\boxed{V_1 = \frac{V C_2}{C_1 + C_2}}$$

=> finding Capacitance in series for two capacitors =

$Q_1 = V C_1$

$= \frac{Q}{C_{eq}} \times C_1$ $\because V = \frac{Q}{C_{eq}}$

$= \frac{Q}{C_1 + C_2} \times C_1$ $\because C_{eq} = C_1 + C_2$

$Q_1 = Q \frac{C_1}{C_1 + C_2}$

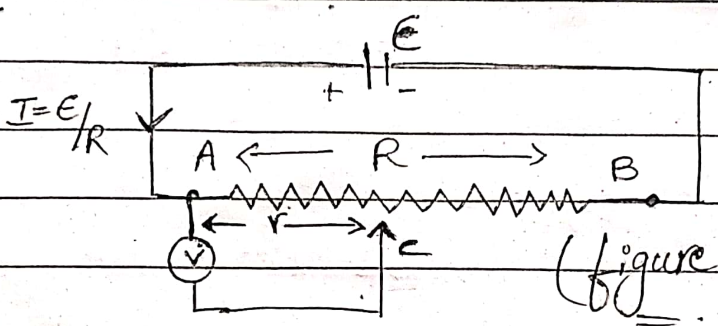
Date: 16/2/2023

M T W T F S

"LACTURE"

RHEOSTATE AND POTENTIO-METER:-
A circuit used to give continausly varing resistance and varing potential.

Describe a circuit which will give continausly varing potential;
IMP.



(figure)

C is a sliding terminal used to vary value of resistance/potential.
If sliding terminal is set to (A) current will pass at maximum. (A to C).
If sliding terminal is set to half of the slide current will start passing at half of given or attatched resistance.
If sliding terminal is set to move at point B the resistance will be maximum and we will also chanee potential (A⟷B).

We say that =

at A | At B

o. | Slide | E.

$r = 0$ | | $r = R$.

RHEOSTAT = (fixed, variable, Potential divider)

A device that uses a sliding resistance that is used to control resistance, current or potential of circuit is called "Rheostat".

POTENTIOMETER =

A veriable resistance with a third adjustable terminal. The potential at third terminal can be adjusted to give any fraction of potential across the end of the resistors.

Date:

M T W T F S

To equal the potential difference we move sliding terminal "A" towards "B" to equal potential difference between small battery attatched to galvanometer and circuit.

After,

$$V_{AC} = E_x$$

So,

$$E_x = V_{AC}$$

$$E_x = V_{AC} = I/R$$

$$E_x = Ir$$

$$E_x = \frac{E}{R} \times r \qquad \because I = E/R$$

$$\boxed{E_x = \frac{E}{l} \times l.}$$ Measure battery potential

$$\boxed{E_1 = \frac{E}{L} \times l^1}$$

$$\boxed{E_2 = \frac{E}{L} \times l^2}$$

So,

$$\frac{E_1}{E_2} = \frac{\cancel{E/l} \times l^1}{\cancel{E/l} \times l^2}$$

$$\boxed{\frac{E^1}{E_2} = \frac{l^1}{l^2}}$$ Measure potential difference B/w two batteries.

Date:

M T W T F S

If Ratio is 1 -
put,

$$\frac{E_1}{E_2} = 1$$

$$\boxed{E_1 = E_2}$$

If ratio is 2 =
Put,

$$\frac{E_1}{E_2} = 2$$

$$\boxed{E_1 = 2E_2}$$

Date: 15/2/2023

M T W T F S

"LACTURE"

MUTUAL INDUCTION:

The phenomena of changing current in a coil to produce e.m.f in another coil is called mutual induction.

"$B = \mu_0 n I$" (flux) -

BACK EMF:

The EMF Produced in secondary coil by mutual induction starts opposing the primary EMF is called Back EMF.

- پیدا ہونے والی ای ایم ایف اپنے پیدا ہونے کی وجہ کی مخالفت کرتی ہے -

BACK EMF:

$$M = -\frac{E_S}{\Delta I_P / \Delta T}$$

$$\Rightarrow E_S = -M \frac{\Delta I_P}{\Delta T}.$$

INDUCTION IN SERIES:

$$L = L_1 + L_2.$$

INDUCTION IN PARALLEL:

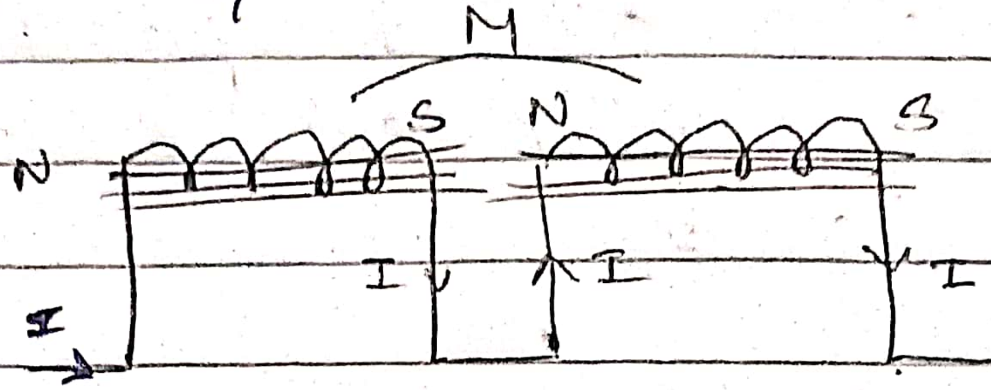
$$\frac{1}{L} = \frac{1}{L_1} + \frac{1}{L_2}$$

$$\frac{1}{L} = \frac{L_2 + L_1}{L_1 L_2}$$

$$\Rightarrow L = \frac{L_1 L_2}{L_2 + L_1}$$

SERIES Supporting:

In series connection of induction coils support EMF of every coil ("South to north")



$$L_a = L_1 + L_2 + 2M$$

SERIES Opposing:

In Parallel connection of induction coils oppose EMF of every coil ("North to North")

In mutual induction coils are connected magnetically.

It has two resistance AC Resistance (XL) and DC Resistance (R).

Reactance of capacitor = (Xc) (AC)
Reactance of capicitor decreases as frequency increases.

$$X_C \propto \frac{1}{f}$$

$$X_C \propto \frac{1}{C}$$

$$X_C \propto \frac{1}{fC}$$

$$X_C = \frac{1}{2\pi} \frac{1}{fC} \therefore \boxed{X_C = \frac{1}{\omega C}}$$

Inductance of capacitor (X_L) (DC)

$$X_L \propto f$$

$$X_L \propto L$$

$$X_L \propto fL$$

$$X_L = 2\pi f L$$

$$\boxed{X_L = \omega L}$$

The combined of capacitor and resistor is called impedance.

formula =

$$Z = \sqrt{X_L^2 + R^2}$$

Date:

M T W T F S

=> Phase Difference=

$$\tan \theta = \frac{X_L}{R}$$

$$\boxed{\theta = \tan^{-1}\left(\frac{X_L}{R}\right)}$$

=> Quality factor=

$$\boxed{Q = \frac{X_L}{R}}$$

=> Flux=

The total number of electric field lines passing a given area in a unit time is called electric flux.

=> ELECTROMAGNETIC INDUCTION=

The production of electromotive force across a conductor in changing magnetic field.

=> CO-EFFICIENT OF COUPLING=

The fraction of magnetic flux produced in a coil that links with the other is called co-efficient of coupling.

The magnetic flux is always produced by current in a coil.

It is represented by "K".

Date: 17/02/2023

M T W T F S

"LACTURE"

⇒ ENERGY SOURCES=

A potential difference devices are energy sources.

The devices that convert non-electrical energy into electrical energy are called energy sources.

EXAMPLES=

Cells & Batteries, Solar cells.

= TYPES OF SOURCES=

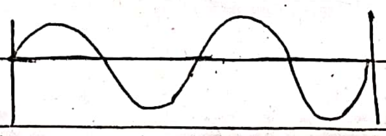
i) AC Sources.

ii) DC Sources.

AC CURRENT=

A current that changes its magnitude and direction continuously is called AC current.

SYMBOL=

A.C 

DC CURRENT=

Unidirectional current having constant magnitude is called DC current.

Date:

SYMBOL=
D·C 

Q= VOLTAIC CELLS=
TYPES OF CELL=
i) PRIMARY CELL=
A cell in which chemical reaction is not reversible or rechargeable. (Clock cells)

ii) SECONDARY CELL=
A cell in which chemical reaction is reversible and rechargeable. (UPS Battery, LiIon battery).

CHARACTERISTICS OF PRIMARY VS SECONDARY CELLS:

REFERENCE ON
BOOK PAGE = 77.

=> BATTERY=
A combination of two or more cells is called battery.
Initial value of cell is 1.5V.
Initial value of battery is 3V.

=> DIFFERENT TYPES OF CELLS=
REFERENCE ON
BOOK PAGE = 77

Date:

M T W T F S

⇒ PHOTOVOLATIC CELL:-

A cell that convert light energy into electrical energy directly. It is also known as Solar cell.

⇒ VOLTAIC CELLS:-

It is a combination of materials which produce direct current (dc) from it its internal reactions.

Date: 02/03/23

M T W T F S

"LACTURE"

=> LINE LOSS:
Loss in a line Power due to resistance is known as line loss.

=> Power loss formula :: "$P = I^2 R$"

and we knows
$$I_s \propto \frac{1}{V_s} \quad \text{(i)}$$

=> as inverse variation we increase voltages (i) by power transformers on generating stations to minimize losses caused by resistance of ($I^2 R$).

=> Basically, Power transformers are used to carry power.

=> EDDY CURRENT:
Current produced in the body of core by changing the magnetic flux is called eddy current.

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Date:

M T W T F S

Date:

=> To minimize eddy current losses we use laminated iron core instead of solid iron core in transformer.

=> Hysteresis loss =
The power loss that occurs due to magnetisation and de-magnetisation of core is called hysteresis loss.

=> We can improve efficiency of transformer by reducing of eddy current & Hysteresis losses in transformer.

=> Impedance of transformer can be found by formula

$$Z = \sqrt{R' + XL'}$$

and

$$Z = \sqrt{R^2 + XL^2}$$