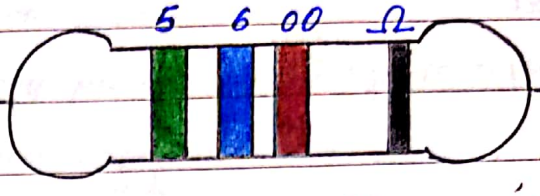
Date: 9/9/20

ELECTRONICS:

Color coding / Resistance Coding :-

$R = 5600\,\Omega \pm 10\%$



* Ist strip = digit
* IInd strip = digit
* IIIrd strip = no. of zeros
* IVth strip = tolerance / inaccuracy / uncertainity (regarding the resistance you've found)

Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Grey	8
White	9

→ start reading from right hand side

→ the list is given in the paper

→ the last strip is on the extreme right of the resistor, silver or golden in color

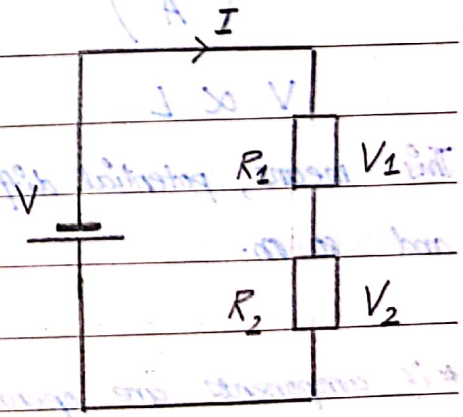
↳ silver = 10%.

↳ gold = 5%.

iska matlab hai 10% ya 5% zyada ya kam hosakti hai resistance compared to what you've found

** the power rating of a resistor is the maximum rate of dissipation of electrical energy as heat before it is damaged (0.25W to 1W is normally suitable)

POTENTIAL DIVIDER CIRCUIT:



$$V_1 = \left(\frac{R_1}{R_1 + R_2}\right) V$$

$$V_2 = \left(\frac{R_2}{R_1 + R_2}\right) V$$

Q. $R_1 = 3V$ $R_2 = 6\,\Omega$ $V = 9V$

$$V_1 = \left(\frac{3}{3+6}\right) \times 9$$

$$V_1 = \left(\frac{3}{9}\right) \times 9 = 3\,V$$

$$V_2 = \left(\frac{2}{3+6}\right) \times 9$$

$$V_2 = \left(\frac{2}{9} \times 9\right) = \frac{18}{5}\,V$$

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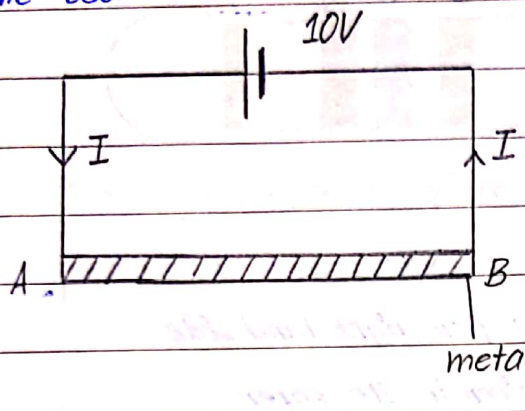
e.g/ CD player

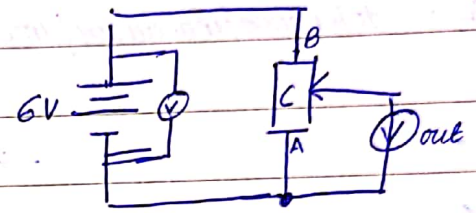
Potentiometer:

→ a type of variable potential divider

→ an arrangement which is used to get variable voltage from the emf of the cell



* current is same for all points but resistance is not



Q. Find potential difference on any 2 points on the wire.

A. $V = IR$

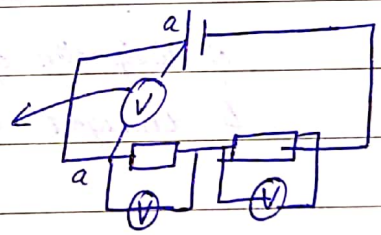
$$V = I\left(\rho \frac{L}{A}\right)$$

$$V = \left(\frac{I\rho}{A}\right) L$$

$$V = \left(\frac{I\rho}{A}\right) L$$

$$V \propto L$$

* junction is a point in a circuit with a specific energy — two terminals of voltmeter connected to same junctions will give 0 voltage



This means, potential difference across whole length is 10V, half length 5V and so on.

* if components are operated beyond their power ratings, they will overheat and damage

→

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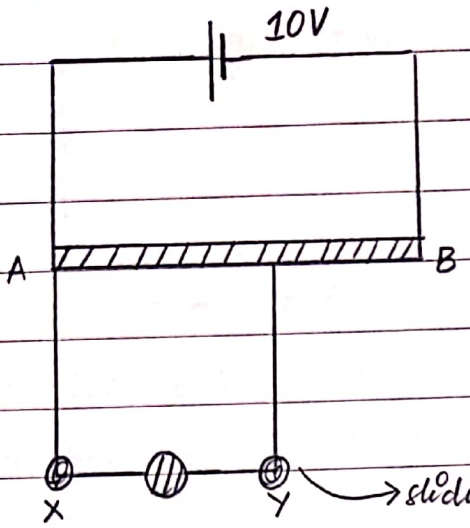


* as we move Y towards B through the sliding contact the voltage and speed increase
* agay peechay kartay hain to voltage aur speed change hoti hai
↳ O pay lay aein gay tou fan band hojaye ga

→ intensity is being controlled
→ the dimmer is used to have this effect

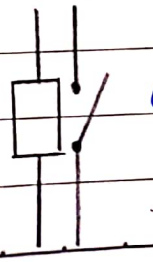
$$R = \left(\frac{\rho}{A}\right) L$$

↳ jis side pay length ziada hain waham pay resistance kam hogi

→ same cell provides variable voltage

Relay:

→ a device which is separated on small current and is used to automatically switch on and switch off another device which operates on large current
→ relay itself is an electromagnet

→ symbol  (a switch & a resistor)

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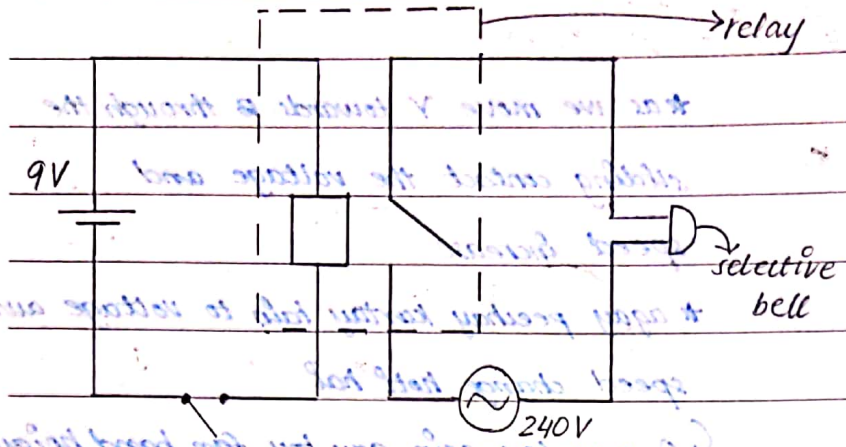

Circuit A (small current) Circuit B (large current)

→ since the switch in circuit A is open, no current passes through relay
↳ it won't become an electromagnet
↳ & won't be able to close second switch B

→ when the switch is closed, current passes through relay
↳ it becomes an electromagnet
↳ as a result closes switch B
↳ & the selective bell rings

★. When you press the doorbell you ... the switch

Diode:

→ a device which allows the current to flow in one direction only is called a diode

→ it converts alternating current to direct current
↳ process is known as rectification

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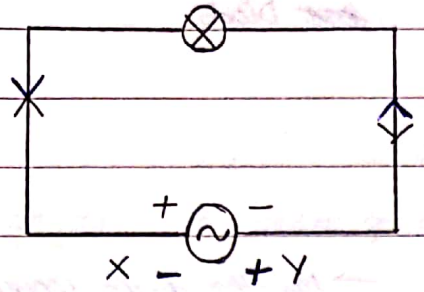
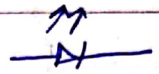


A·C : magnitude varies (0 − 7 A) fluctuates from

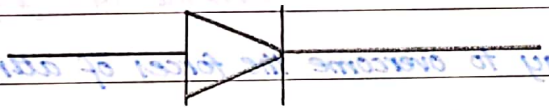
D·C : magnitude same (7A throughout)

★  : LED (light emitting diode) will only blink if A·C is being provided
↳ will glow if D·C

• +ve half cycle : X to Y

• −ve half cycle : Y to X

→ the diode conducts only positive cycles of A·C and does not allow the negative cycles to pass through it

→ symbol : 

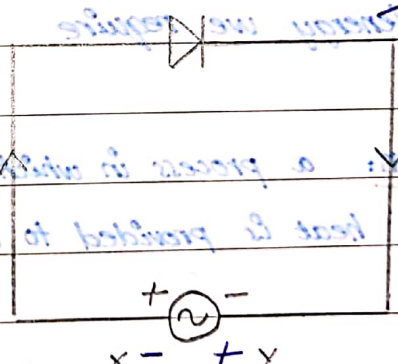
★ arrowhead represents direction of current

★ straight line will block current coming from the other end

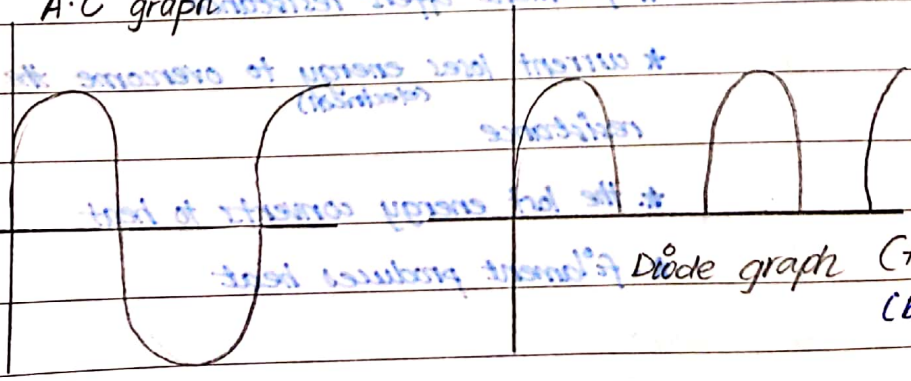
Rectification : converting A·C into D·C (even though A·C is being provided current will only be allowed to flow in one direction)

• +ve cycle kaylie current flow karnay day ga

• −ve kaylie nahin karnay daygа



A·C graph



Diode graph (+ve only)
(block −ve cycle)

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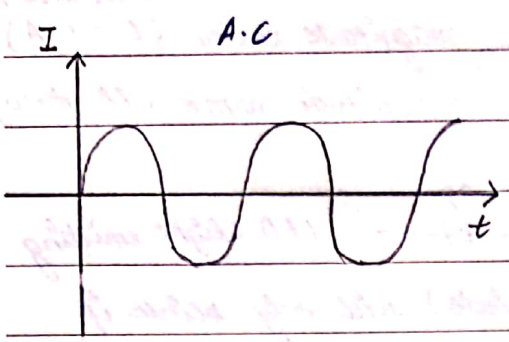
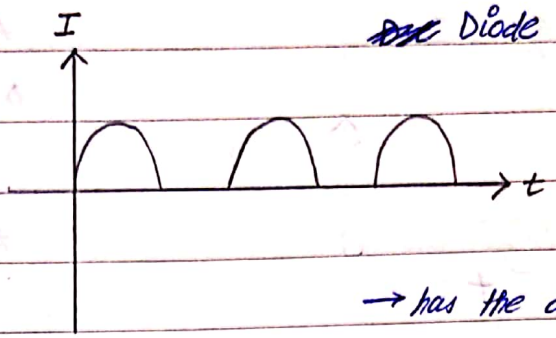


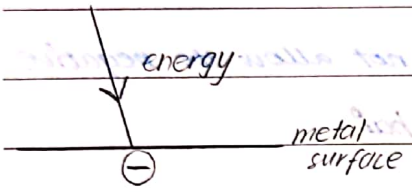


Q. Are both of them A·C?

A. jis kay 2 axis hon woh A·C hota hai.

→ has the diode converted A·C to D·C?

A. Yes but has only changed direction not magnitude which is why you can not draw a straight line graph this time.

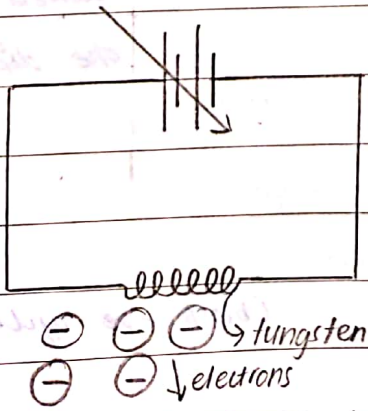


→ the free electron absorbs the energy to overcome the forces of attraction of the metal — if the energy is enough

→ since heat is a form of energy, there is a possibility of electron overcoming attracting the attractive forces if heat is provided the metal surface

→ in both cases there is a possibility b/c we're not sure what exact amount of heat/energy we require

Thermionic immission: a process in which electron come out of metal when heat is provided to it



* filament offers resistance
* current loses energy to overcome the resistance (electricity)
* the lost energy converts to heat
* filament produces heat

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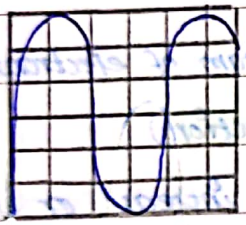
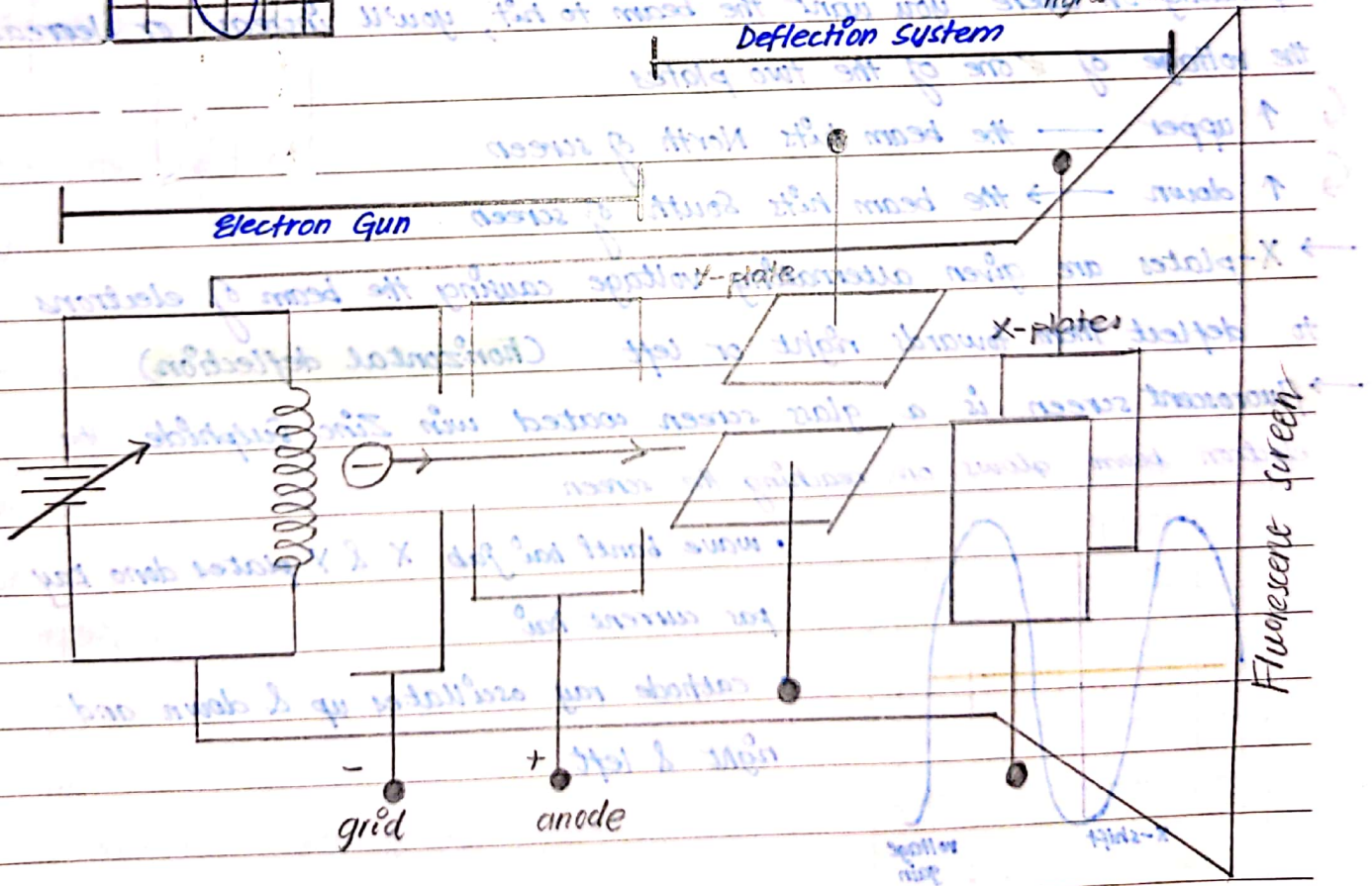
cathode ray: a beam of electrons coming out of tungsten filament due to heat

CATHODE RAY OSCILLOSCOPE (CRO)

→ a device which is used to produce voltage-time trace on the flourescent screen





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→ parts:

* electron gun
* deflection system
* fluorescent screen

→ electrons overcome the forces of attraction and come outside of the tungesten filament

→ the grid helps to form a fine beam of electrons (through repulsion) controls the no. as well

→ the anode pulls the electrons and accelerates them

↳ stronger anode — higher speed

→ Y-plates are given alternating voltage causing the beam of electrons to deflect it upwards or downwards (vertical deflection)

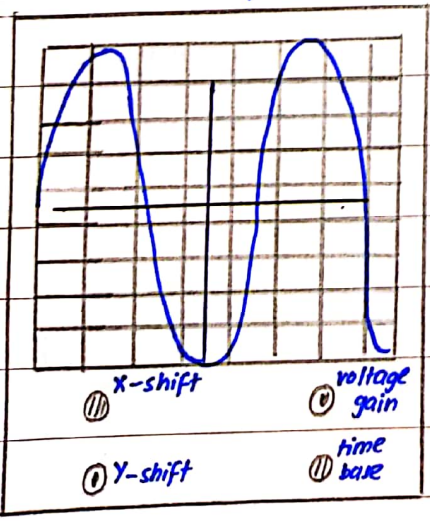
↳ depending on where you want the beam to hit, you'll increase or decrease the voltage of one of the two plates

↳ ↑ upper — the beam hits North of screen

↳ ↑ down → the beam hits South of screen

→ X-plates are given alternating voltage causing the beam of electrons to deflect them towards right or left (horizontal deflection)

→ fluoroscent screen is a glass screen coated with Zinc Sulphide. the electron beam glows on reaching the screen



• wave banti hai jab X & Y plates dono kay pas current hai

• cathode ray oscillates up & down and right & left

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if only Y plates are given voltage : horizontal line ——

if only X plates are given voltage : vertical line ——

- to move along X-axis ⟹ X-shift button (the graph)
- to move along Y-axis ⟹ Y-shift button

Voltage gain : e.g/ 5V/cm

Time base : e.g/10ms/cm

voltage = amplitude x Y-gain

→ the CRO can be used for :

* Measuring A.C voltage
* Displaying voltage waveforms
* Measuring short intervals of time

voltage sensitivity : it is voltage used by CRO trace per division e.g/ 5V/div

Y-gain

time-base valve : it is time used by CRO trace per division e.g/ 3ms/div

***

⟹ the following calculations can be made by using values of voltage sensitivity and time base :

1). Voltage

(no. of divisions in an amplitude) x (voltage sensitivity)

2). Time Period

(no. of divisions in one cycle) x (time base value)

3). Frequency

$\frac{1}{T}$

Date: _____

THERMONIC EMISSION :

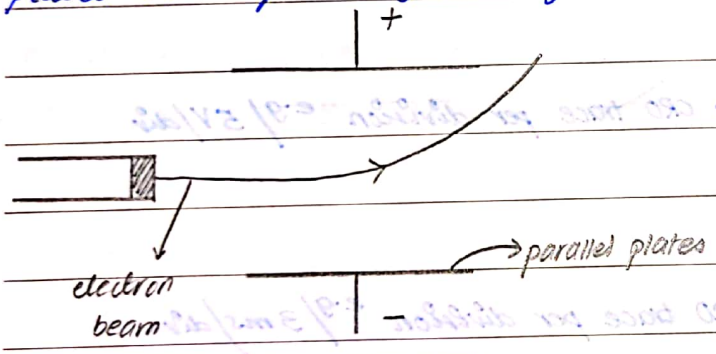
→ it is emission of electrons from a metal filament, as heated by passing current

→ since, there are large number of free electrons in metals, when current is passed through the metal filament then due to resistance, heating effect is produced

→ the free electrons gain energy and emit out from filament

Deflection by electric field :

* when an electron beam passes b/w two charged plates, it can be observed that the electrons are deflected towards the positive plate
* the electrons are attracted by the positive charges on the positive plates and repelled by the negative charges on the negative plate



Deflection by magnetic field :

→ when an electron beam passes b/w. two poles of the magnet, it can be observed that the electron beam is deflected

→ using the Left-Hand Rule, it is observed that the beam deflects downwards