Circuit

Circuit → ৫ টি element থাকে

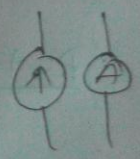
I. voltage source } soovee
II. Convert "
III. Resistor "
IV. Inductor " } load.
V. capacitor "

① Active element → যে নিজে কাজ করতে পারে
② Pasive element → Active -এর উপর নির্ভরশীল

* Resistion → R → Ω /ohm
* Induction → L → Henreg / H
* Capacitor → C → farade / F

① voltage source
- Ac → $\frac{P}{\sqrt{2}}$ V_{dc}
- Dc → + ⏦ − V_{ac}

② Current source
- Ac → Amp / A
- Dc



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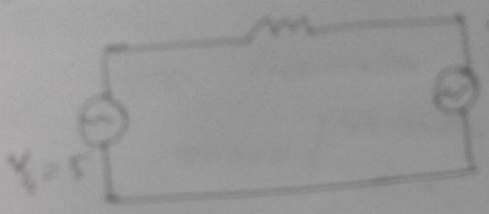


* $1\ u = 1 \times 10^{-6}$
$1\ n = 1 \times 10^{-9}$
$1\ p = 1 \times 10^{-12}$
$1\ m = 1 \times 10^{-3}$
$1\ k = 1 \times 10^{3}$
$1\ m = 10 \times 10^{6}$.

n-type:

I. ...
II. As doping
III. ইলেকট্রন কে negative ও charge
IV. 5টি ...

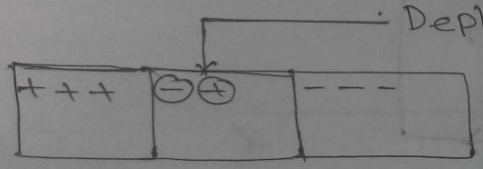
P-type

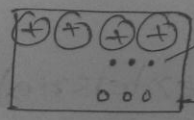
I. ...
II. Al doping
III. positive ও ইলেকট্রনকে Hole বলে।
IV. 3টি ...

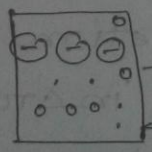
Diode: P ও n type এর সমন্বয়ে তৈরি। AC কে DC তে converts করে Rectifiers.

✱ Working principle P-N Junction diode:

I. Majority carrier
II. Minority carrier.



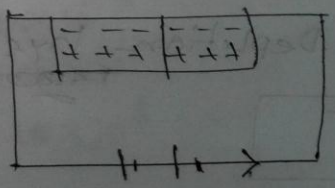




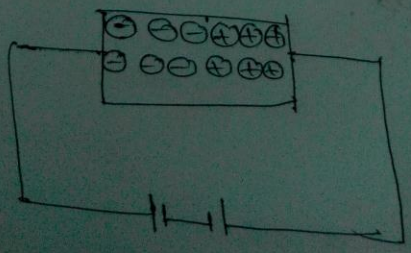
P-type.

Biasing a pn junction:

① Forward biasing: When external d.c voltage applied to the junction is in such a direction that it cancels the potential barrier, thus permitting current flow, it is called forward biasing.



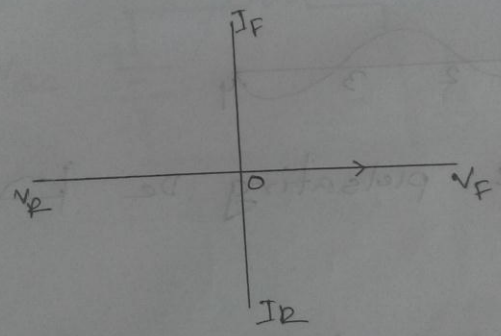
Reverse biasing: when the external d.c voltage applied to the junction is in such a direction that potential barrier is increased it is called reverse biasing.



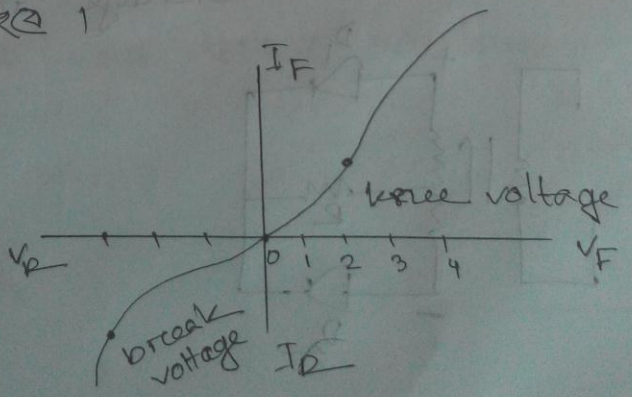
* characteristics current of P-N Junction diode or, VI characteristics curve.

Or, volt.

Indeal diode/ Practical diode:



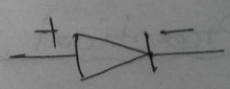
0 থেকে সামান্য V_F এর দিকে বাড়লে current flow করতে থাকে।

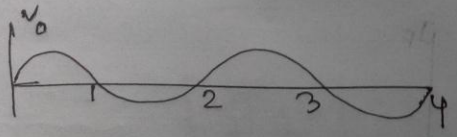


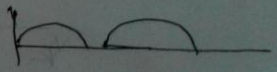
PIV: Peak Inverch voltage বা voltag এর কারণে diod নষ্ট হয়।

* Knee voltage: It is the forward voltage at which the current through the junction starts to increase rapidly.

Half wave

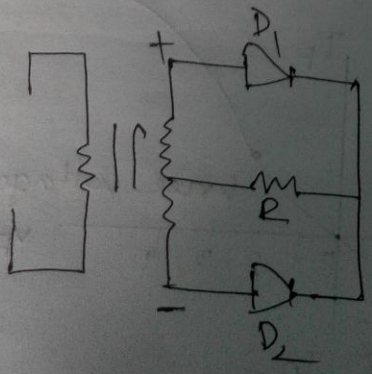
* Diode 

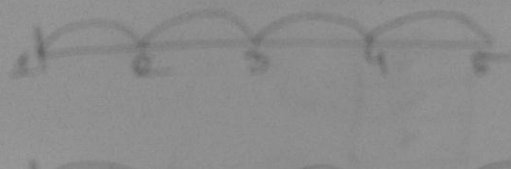


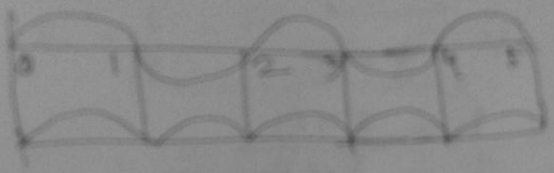
Half wave pulsating DC 

Full wave:

1. Center full wave rectifier
2. full wave bridge rectifier.

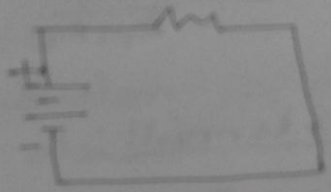






Resistor:

$V = V_{DC}$



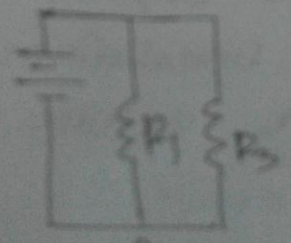
Resistor.

$I \propto V$

$I = 1/R \times V$

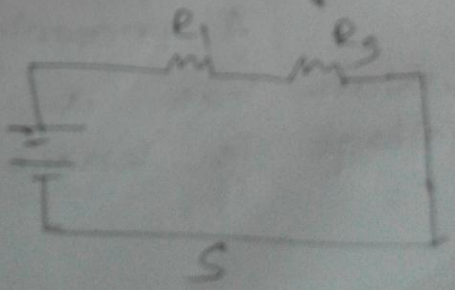
$I = GV$ [$G = 1/R$ mho/℧/siemens

+ + / − − চার্জ এর কারণে voltage.



P

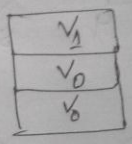
$1/R_P = 1/R_1 + 1/R_2$



S

$R_T = R_1 + R_2$

* Current divider rull:



$$V = V_1 = V_2$$

$$I_1 = \frac{I \times R_2}{R_1 + R_2}$$

$$I_2 = \frac{I \times R_1}{R_1 + R_2}$$

voltage divider rull:

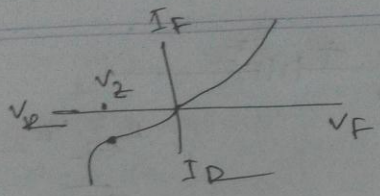
$$I = I_1 = I_2$$

$$V_1 = \frac{V \times R_1}{R_1 + R_2}$$

$$V_2 = \frac{V \times R_2}{R_1 + R_2}$$

Zenar Diode:

A properly doped crystal diode which has a sharp breakdown voltage is know as a zenar diode

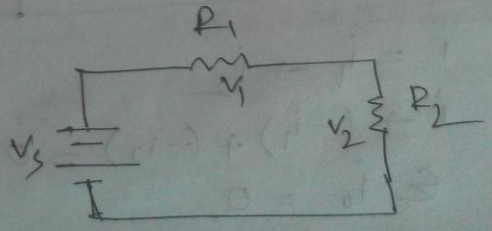


$$R = \frac{E_i - E_0}{(I_z)_{min} + (I)_{max}}$$

$$= \frac{(V_3 - 10)}{(15 + 85)} = \frac{3}{100} = 30\ \Omega$$

* A semiconductor is a substance which has almost filled valence band and nearly empty conduction band with a very small energy gap separating the two.

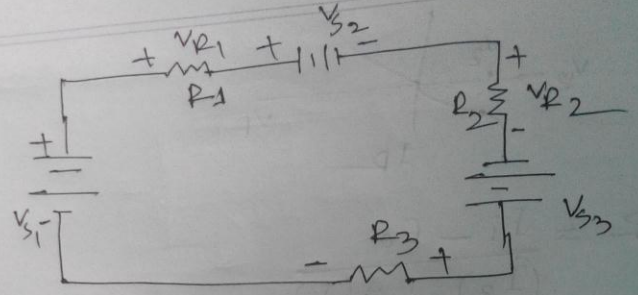
KVL and KCL:



$$V_S = V_1 + V_2$$

$$V_S = (-V_1) + (-V_2) = 0$$

$$\Sigma V_1 = 0$$

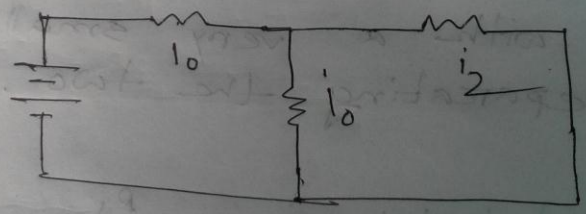


* $V_{S_1} + (-V_{S_2}) + V_{S_3} = V_{R_1} + V_{R_2} + V_{R_3}$

$\Rightarrow V_{S_1} - V_{S_2} + V_{S_3} = V_{R_1} + V_{R_2} + V_{R_3}$

$\Rightarrow V_{S_1} - V_{S_2} + V_{S_3} - V_{R_1} - V_{R_2} - V_{R_3} = 0.$

KCL:

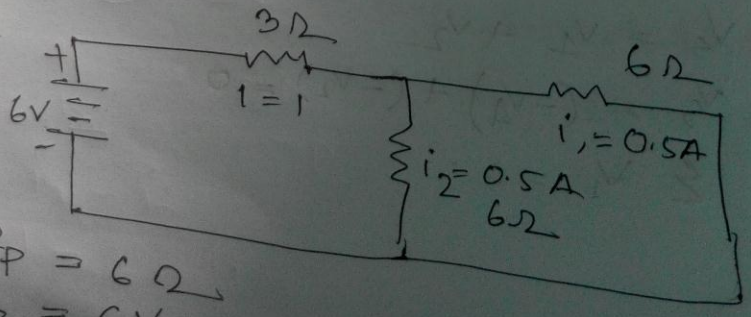


$i = i_1 + i_2$

$i + (-i_1) + (-i_2) = 0$

$\Sigma i_0 = 0.$

KCL:



$R_P = 6\,\Omega$

$V_S = 6V$

$\therefore \quad i = 6/6 = 1\ A$

$1\ A = 0.5 + 0.5$

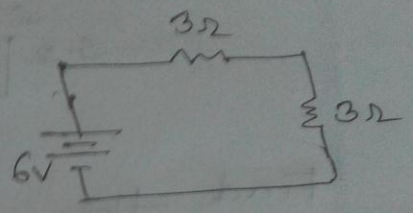
$= 1\ A$.

KVL:

$6V = IR_1 + IR_2$

$= 1 \times 3 + 1 \times 3$

$= 6V$



$V = IR$

$V = IR$

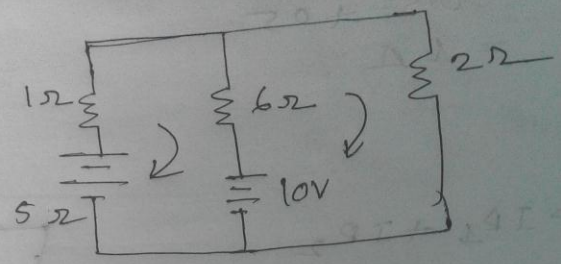
* Registance ~~→~~ উল্টা হয় (+ হলে N) (- হলে P) e+ থেকে e- থেকে

* Registance ~~→~~ উল্টা হয় (+ হলে N) e+ থেকে (বড় হলে) (- হলে P) e- থেকে বেশি হলে।

voltage rise = voltage drop

Source = voltage drop.

MESH Analysis:



Find the current in each branch

Loop 1 = KVL:

voltage rais = voltage drop

$5 - 10 = i_1 \times 1 + (i_1 - i_2) \cdot 6$

$-5 = 7i_1 - 6i_2$ .. (I)

Loop 2 = KVL:

$10\ V = 6(i_2 - i_1) + 2i_2$

$10V = -6i_1 + 8i_2$ .. (II)

(I) 3 (II) $\Rightarrow$

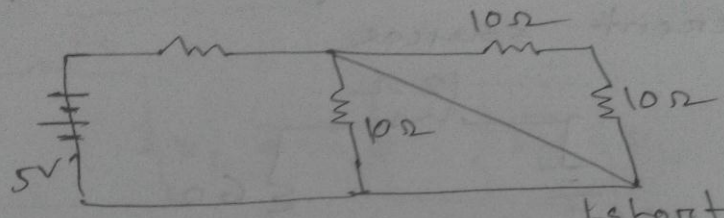
$i_1 = 1$ Amp

$i_2 = 2$ Amp

$\therefore i_1 - i_2$

$1 - 2 = 1$ Amp

MATH:



Find current I.

* $V = I \times R$

$I = V/R$

$= -5/5$

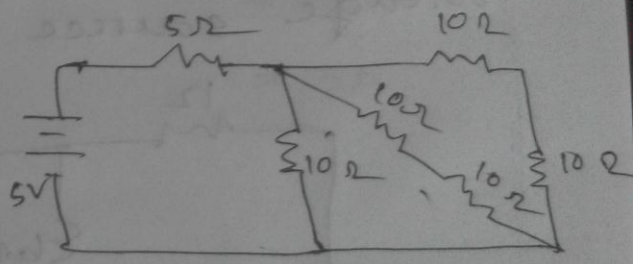
$= 1$ Amp

$$1/R_p = 1/R_1 + 1/R_2 + 1/R_3$$

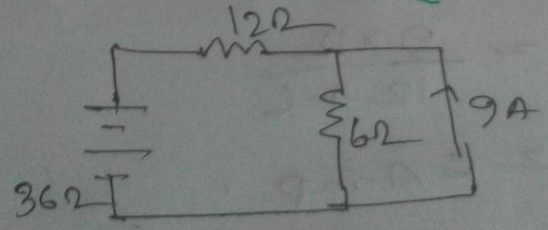
* $V = V/R$

$= 5/10$

$= 0.5$

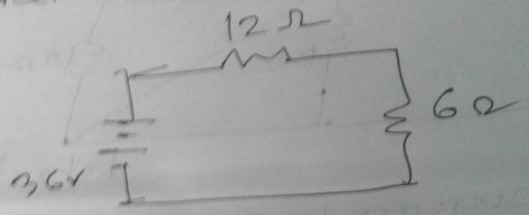


Super position theorem:



$I = I_1 + I_2$

(i) Consider voltage source ⇒ open current source.

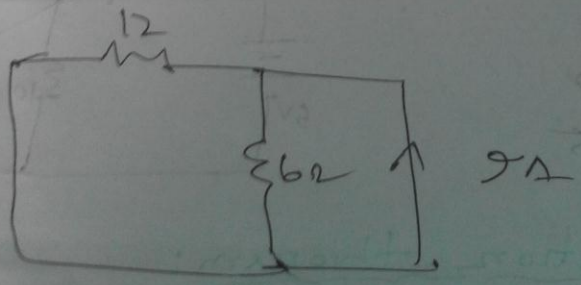


$$I = \frac{V}{R_1}$$

$$= \frac{36}{12+16}$$

$$= 2\,Amp$$

(ii) Consider current source → voltage source short circuited



$$I_2 = \frac{9 \times 12}{12+6}$$

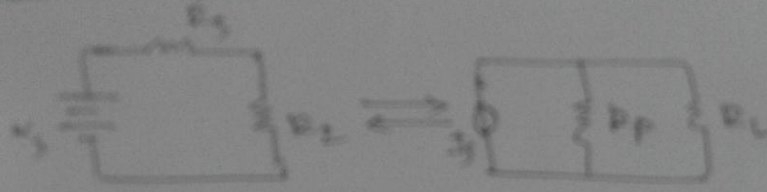
$$= 6\,Amp.$$

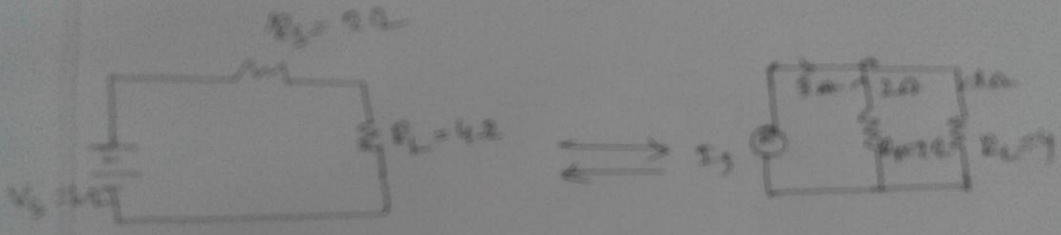
$$\therefore I = I_1 + I_2$$

$$= 2 + 6$$

$$= 8\,Amp$$

Source conversion:





$$I_L = \frac{V_s}{2+4}$$

$$= 6/6$$

$$= 1\,A$$

$$I_s = \frac{V_s}{R_s}$$

$$= 6/2$$

$$= 3A$$