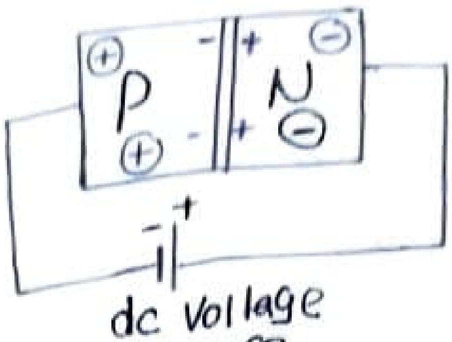
Reverse Bias
① Apply dc Voltage accross Diode
② Current will not flow through P-N junctio

الشرح



① When (−) of dc Voltage is connected to P-region and (+) of dc Voltage is connected to N-region, the junction Diode is reverse baised.

② (+) of dc Voltage pulls the free electrons which are the majority carriers in N-region away from the P-N junction because unlike charges attract.

③ electrons flow toward the positive side of dc Voltage additional positive ions are created.

④ Width of depletion region increase.

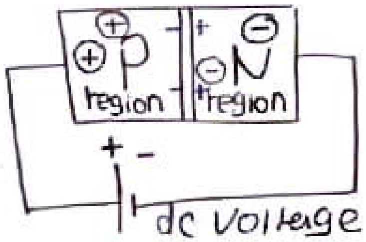
⑤ Current will not flow through P-N junction.

Forward Bias	Reverse Bias
Diode → short circuit with 0.7 volt (Si) and 0.3 (Ge)	Diode → open circuit

1 Discuss the Working of a P-N junction diode under Forward and reverse biasing. Draw I-V Characteristic Curve of the junction Diode.

Forward Bias

① Apply dc voltage across Diode.
② Current will flow through the PN junction.



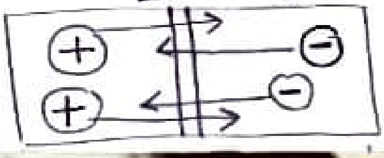
الشرح

① When (−) of dc voltage is connected to N region and (+) of dc voltage is connected to P region, the junction Diode is Forward baised.

② (−) of dc voltage pushes the Free electrons which are the majority carriers in N-region toward P-N junction because the Like charges repel.

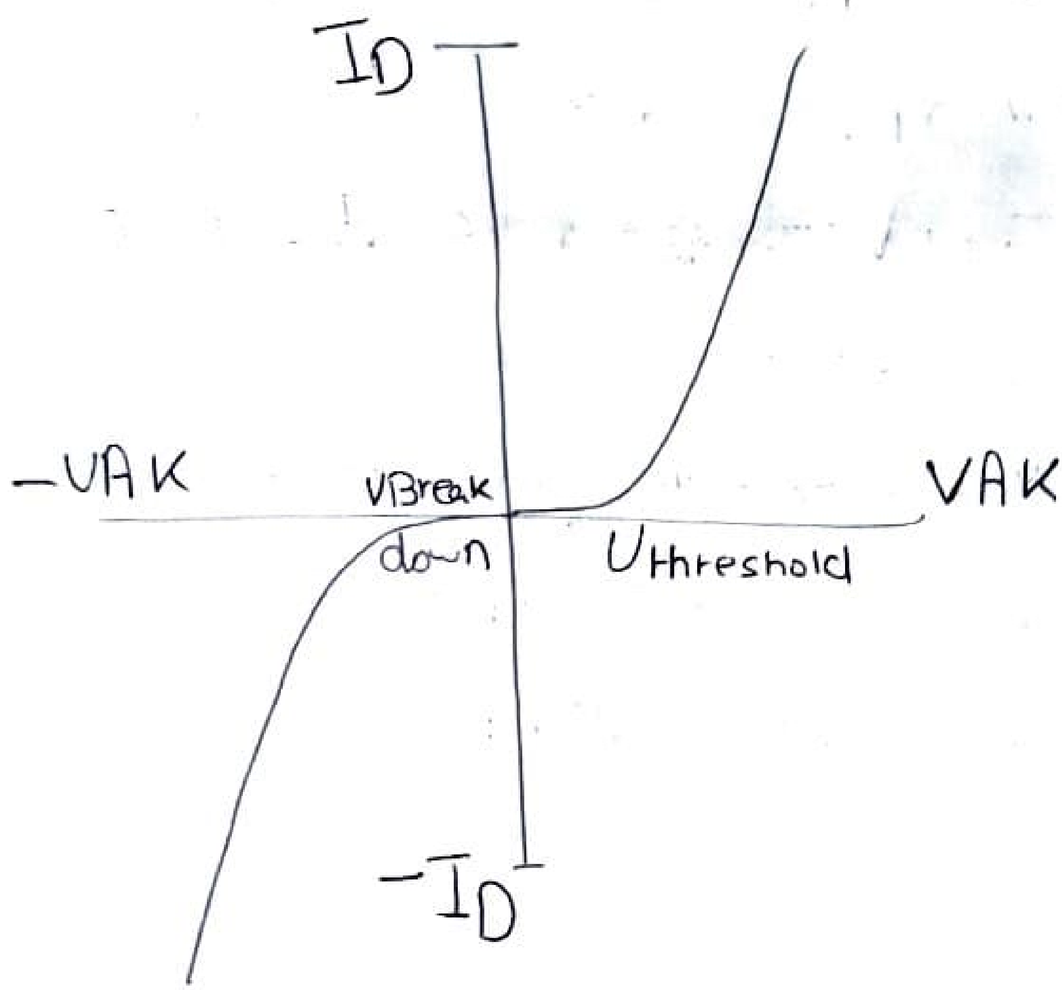
③ the voltage source provides sufficient energy to Free electrons to over come the barrier of depletion region and move on through the P region

④ Current will flow through PN junction and the circuit.



$V_{ripple\ p-p} = \frac{1}{FRC}(V_{Peak})$	$V_{ripple} = \frac{V_{Peak}}{2FRC}$	$V_{ripple} = \frac{V_{Peak}}{2\pi RC}$
Ideal Diode	Ideal Diode	Ideal Diode

I-V
Characteristic Curve of Diode



$$V_{out\ r.m.s} = \frac{V_{out\ Peak}}{\sqrt{2}}$$

$$V_{out\ Avg} = \frac{V_{out\ Peak}}{\pi} = V_{out\ DC}$$

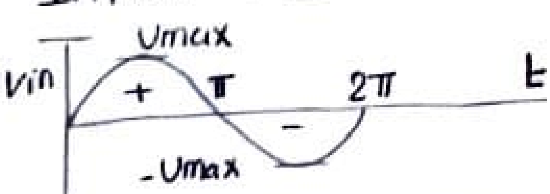
$PIV = V_{out\ Peak}$

Peak Inverse Voltage

output Frequency = 50HZ

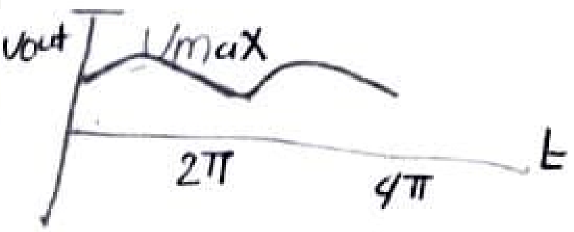
With Capacitor

Input Signal



Input Frequency = 50HZ

output Signal



$V_{ripple} = V_{Peak} - V_{dc}$

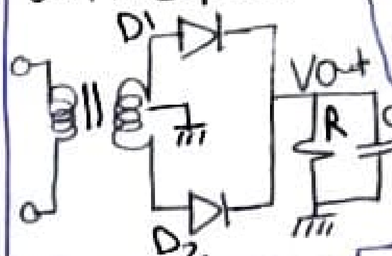
$$V_{out\ r.m.s} = \frac{V_{out\ Peak}}{\sqrt{2}}$$

$$V_{out\ Avg} = \frac{V_{out\ Peak} \times 2}{\pi} = V_{out\ DC}$$

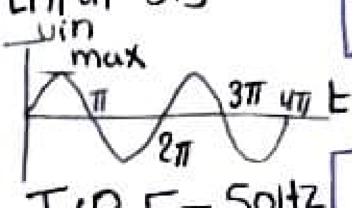
at each Diode

PIV (Fullwave) = 2 Vpeak + 0.7

with Capacitor

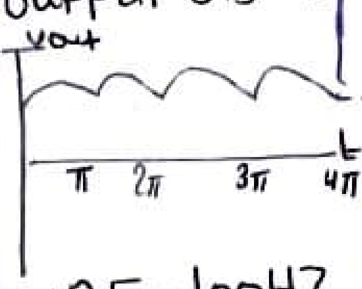


Input signal



I/P F = 50HZ

output Signal



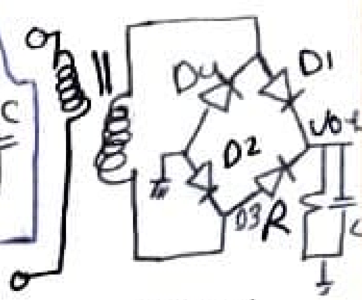
O/P F = 100HZ

$V_{ripple} = V_{Peak} - V_{dc}$

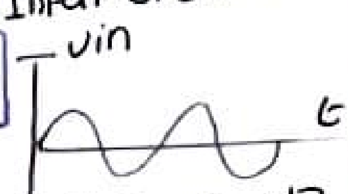
PIV = VPeak + 0.7

at each Diode

with Capacitor

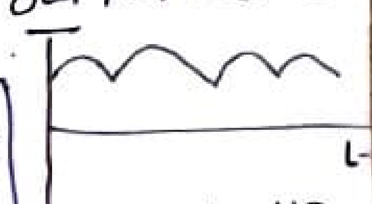


Input signal



I/P F = 50HZ

out Put Signal

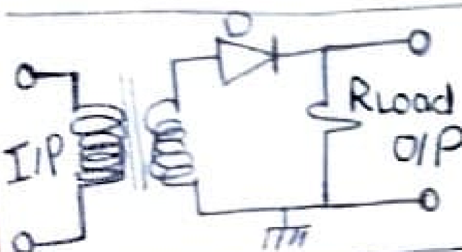


O/P F = 100HZ

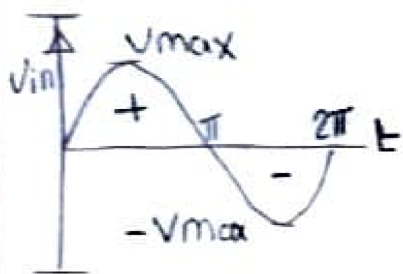
$V_{ripple} = V_{Peak} - V_{dc}$

Comparison between Half wave Rectifier and full wave Rectifier without Capacitor and with Capacitor.

Half wave Rectifier

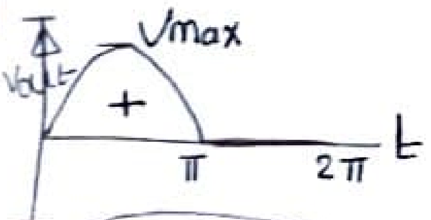


Input Signal



Input Frequency = 50 HZ

output Signal



Ideal Case

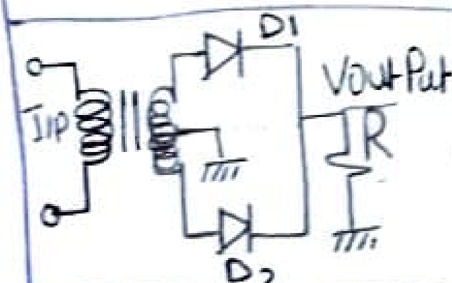
$V_{out\,Peak} = V_{max} = V_{sec}$

Practical Case

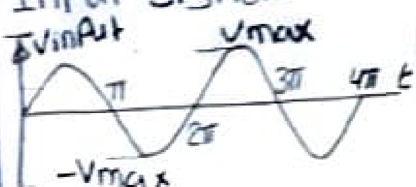
$V_{out\,Peak} = V_{sec} - 0.7$

Full wave Rectifier

Center tapped

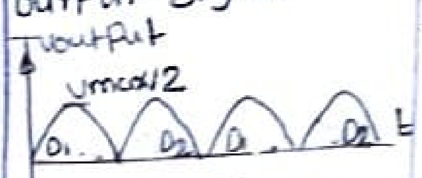


Input Signal



Input Frequency = 50HZ

output Signal



output F = 2x50 = 100 HZ

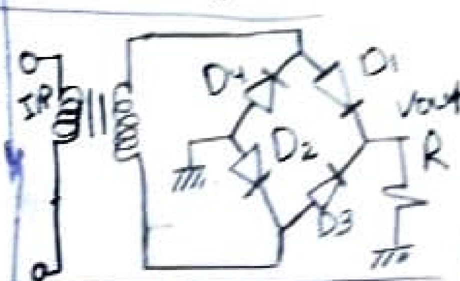
Ideal Case

$V_{out\,Peak} = \frac{V_{sec}}{2}$

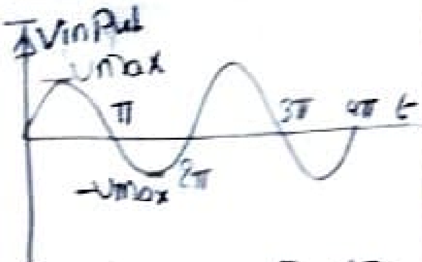
Practical Case

$V_{out\,Peak} = \frac{V_{sec}}{2} - 0.7$

Bridge

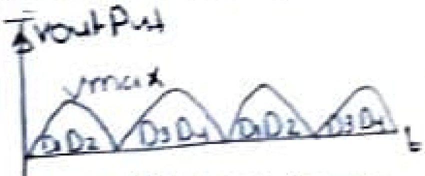


Input Signal



Input Frequency = 50 HZ

output Signal



output F = 2x50 = 100 HZ

Ideal Case

$V_{out\,Peak} = V_{max}$

Practical Case

$V_{out\,Peak} = V_{max} - 0.7 \times 2 = V_{max} - 1.4$