-: COURSE DETAILS:-

Course title :- EDC

Module :- 3rd

Instructor :- Dr- Shahryar

:STUDENT DETAILS:-

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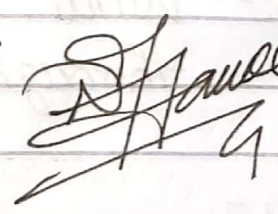
Student sign :- 

→ Q NO.1:- For the circuit given in figure, answer and solve the following problems.

↳ (a):- what type of circuit is this?

Ans (a):- This type of circuit is called center tapped full wave rectifier.

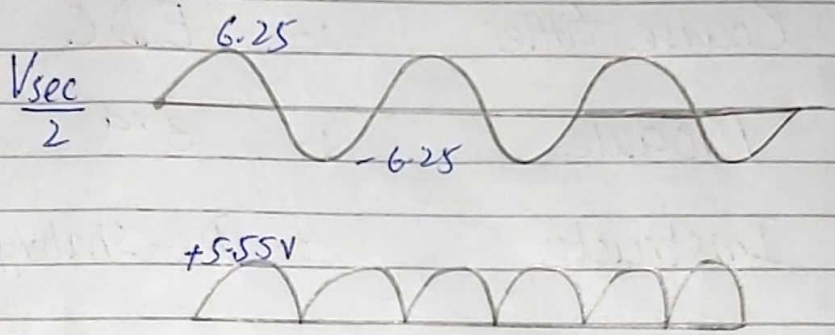
↳ (B):- what is the total peak secondary voltage?

Ans (B):- $V_{p(sec)} = n V_{p(pri)} = 0.25(50)$

$$\boxed{V_{p(sec)} = 12.5\ V}$$

↳ QC:- Find the peak voltage across through each diode?

Ans:



↳ 6.25 is peak to peak voltage the output voltage has peak value (6.25-0.7) which is diode drop.

↳ QD:- What is the peak current through each diode?

Ans:-

$$I_F = \frac{\frac{V_{p(sec)} - 0.7}{2}}{R_L} = \frac{5.55V}{10K\Omega}$$

$$\boxed{I_F = 0.555mA}$$

↳ QE:- What minimum PIV rating the diode have?

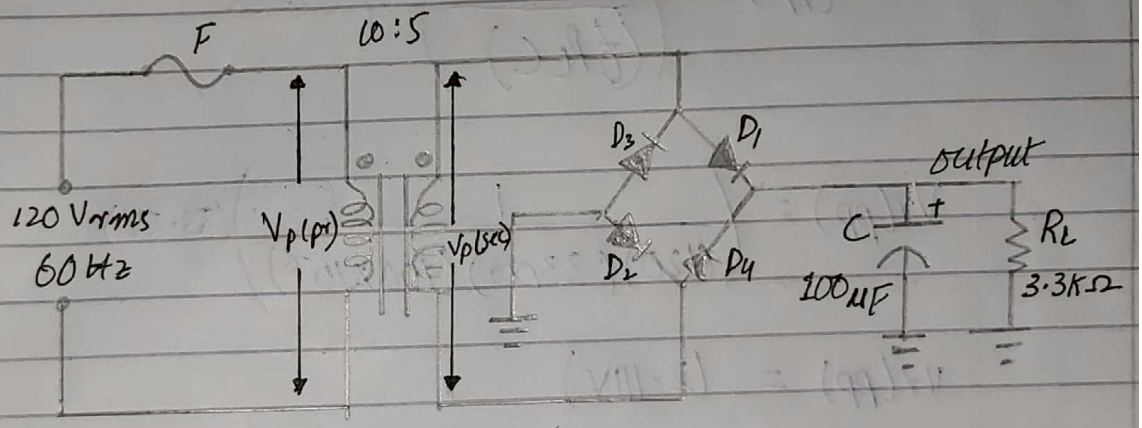
Ans:- PIV Rating the diode have.

$$PIV = 2V_{p(out)} + 0.7$$
$$= 2(5.55V) + 0.7$$

$$\boxed{PIV = 11.8V}$$

Q NO. 2:-

Determine the ripple factor for the filtered bridge rectifier with a load as indicated in Figure 2.



Solution:-

The transformer trans ratio is $n = 0.5$

The peak primary voltage is

$$V_{p(pri)} = 1.414 V_{rms} = 1.414(120V) = 170V$$

The peak secondry voltage is

$$V_{p(sec)} = nV_{p(pri)} = 0.5(170V) = 85V$$

The unfiltered peak full-wave rectified voltage is

$$V_{p(rect)} = V_{p(sec)} - 1.4V$$

$$V_{p(rect)} = 85 - 1.4V$$

$$V_{p(rect)} = 83.6V$$

The frequency of a full-wave rectified voltage is 120 Hz.
The approximate peak to peak ripple voltage at the output is

$$V_{r(pp)} = \left(\frac{1}{fR_LC}\right) V_{p(rect)}$$

$$V_{r(pp)} = \left(\frac{1}{(120)(3300)(100\times10^{-6})}\right)(83.6V)$$

$$V_{r(pp)} = (2.111V)$$

The approximate dc value of the output voltage is determine as follows

$$V_{DC} = \left(1 - \frac{1}{2fR_LC}\right) V_{p(rect)}$$

$$V_{DC} = \left(1 - \frac{1}{(240)(3300)(100\times10^{-6})}\right)(83.6)$$

$$V_{DC} = \left(1 - \frac{1}{79.2}\right)(83.6) =$$

$$V_{DC} = (1 - 0.012)(83.6) = 0$$

$$V_{DC} = 82.6$$

The resulting ripple factor is

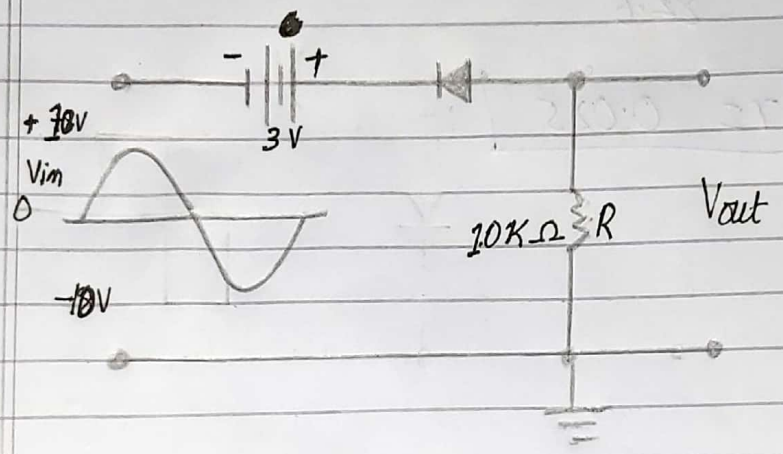
$$r = \frac{V_{r(pp)}}{V_{DC}}$$

$$r = \frac{2.111}{82.6} = 0.025$$

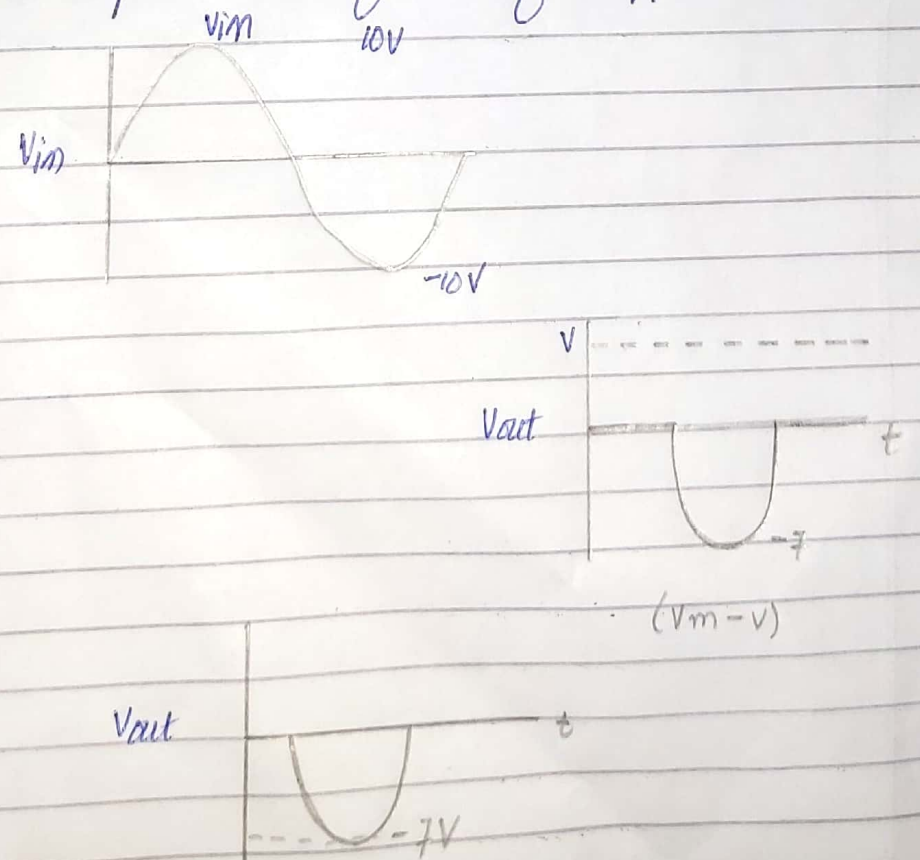
$$\therefore \boxed{r = 0.025} \;\;\therefore$$

Q No. 3:-

Determine the output voltage waveform for the circuit given in Figure 3.



↳ Output waveform of clipper circuit.



Q NO. 4:-

Determine the output voltage waveform for the circuit given in Figure 4. Assume the RC time constant is much greater than the period of the input-

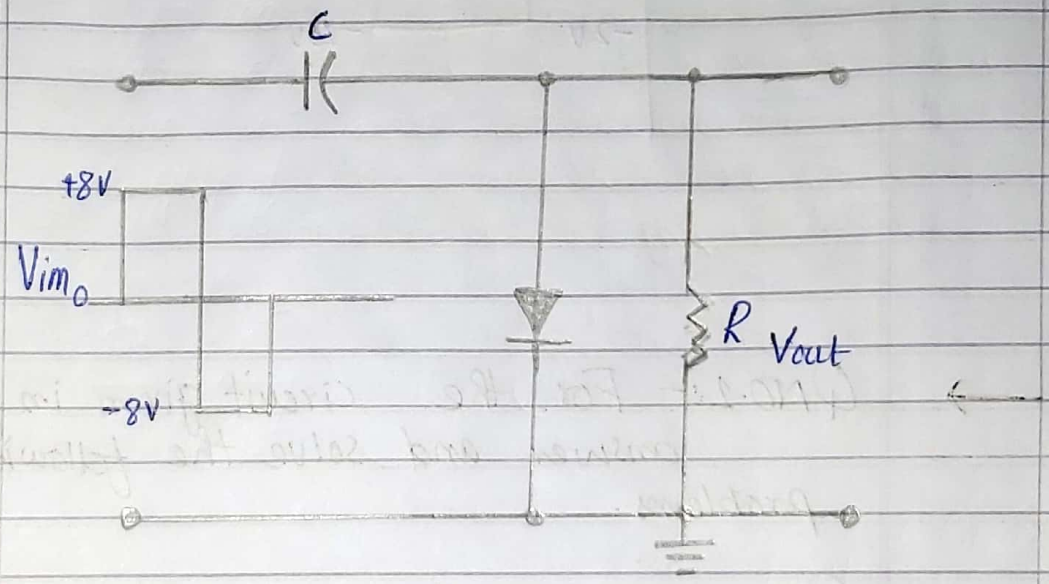


Figure 4.

Assume the RC time constant is much greater than the period of the input So if we take :-

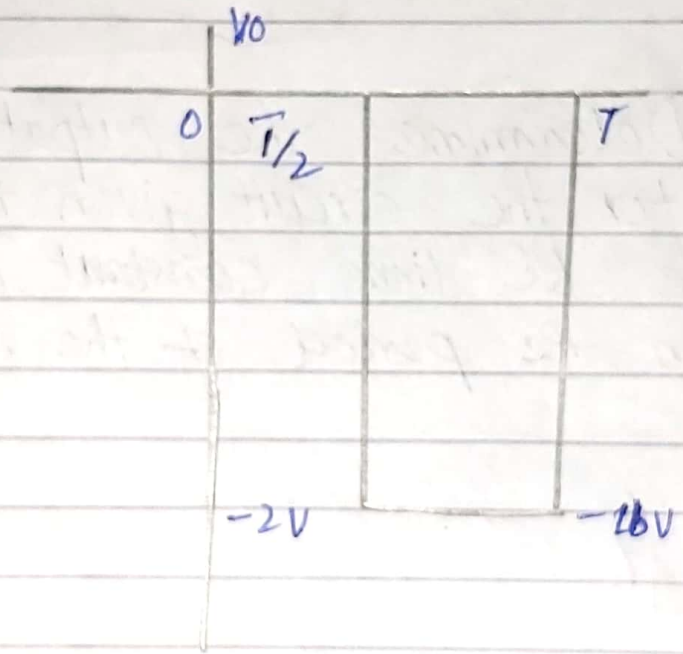
$(5T \text{ discharge} \geq 50\ T/2)$ thus we obtain condition for the clamping operation.

$$T \text{ discharge} \geq 5T$$

So

$$V_o = V_i - V + V_p(ov)$$

∴ T is the position of input signal V_i



Q NO.5 :-

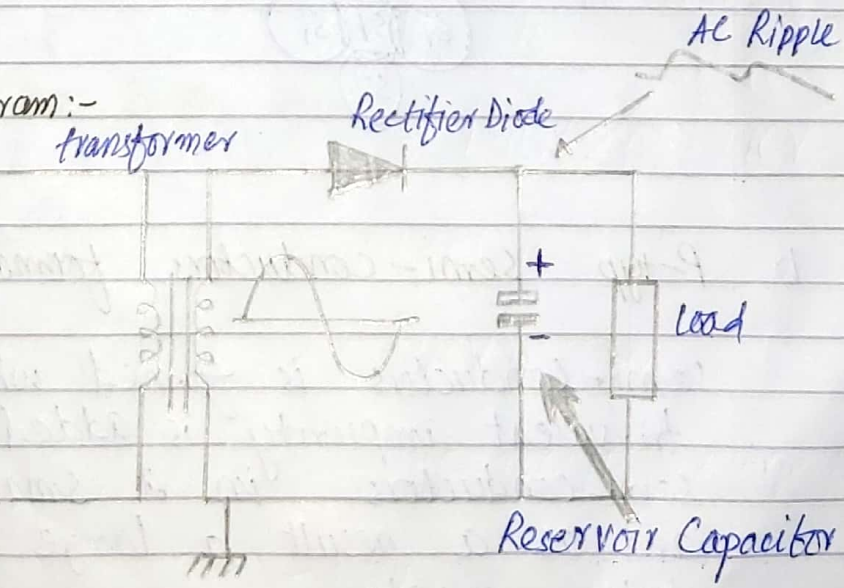
Answer the following Questions-

(a) what is a Power supply Filter? Discuss its operation with the help of a circuit diagram-

Ans Power Supply Filters-

The power supply filter is Capacitor. Capacitors are used to smooth (filter) the pulsating DC output after rectification so that a nearly constant DV voltage is supplied to the load-

Diagram:-



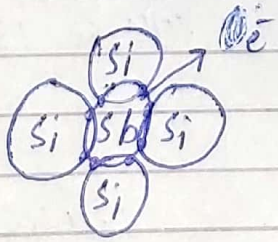
↳ AC Ripple :- Reducing Ripples as capacitor charging and discharging-

(B) How are n-type and p-type semi-conductors formed?

↳ N-type semi-conductor formation:-

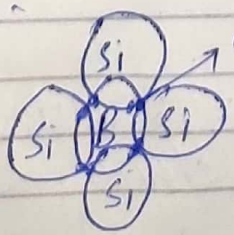
when a small amount of Pentavalent impurity is added to a pure silicon-crystal- it forms N-type semi-conductors

The addation of Penta valent impurity Produces a large no. of free electron in the host crystal.



↳ P-typ semi-conductors formation:-

P-type semi-conductors is formed when a tri-valent impurity is added to a pure semi-conductors in a small amount and as a result a large number of holes create.



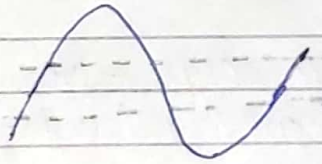
Q No. C:-

What is diode limiter, what is the difference between a positive limiter and a negative limiter?

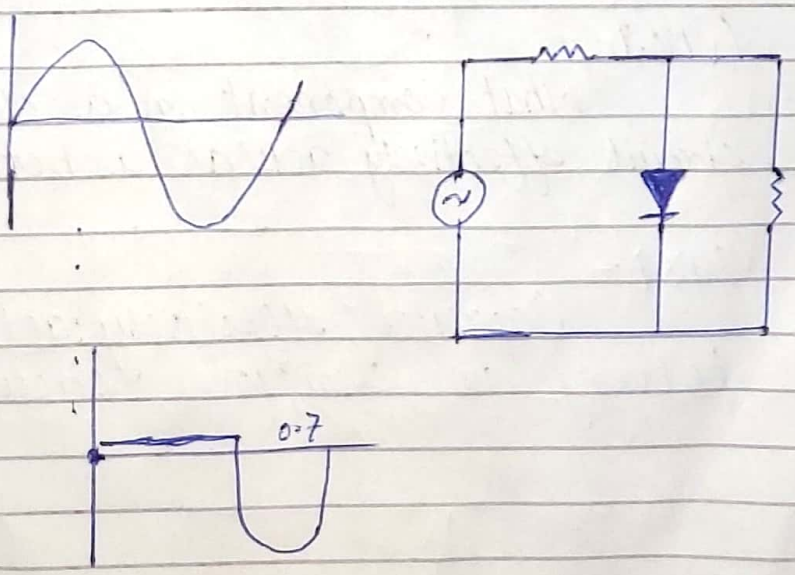
Ans:-

Diode limiter:-

It is a type of circuit which is designed to clip a part of signal or AC signal to desired waveform.

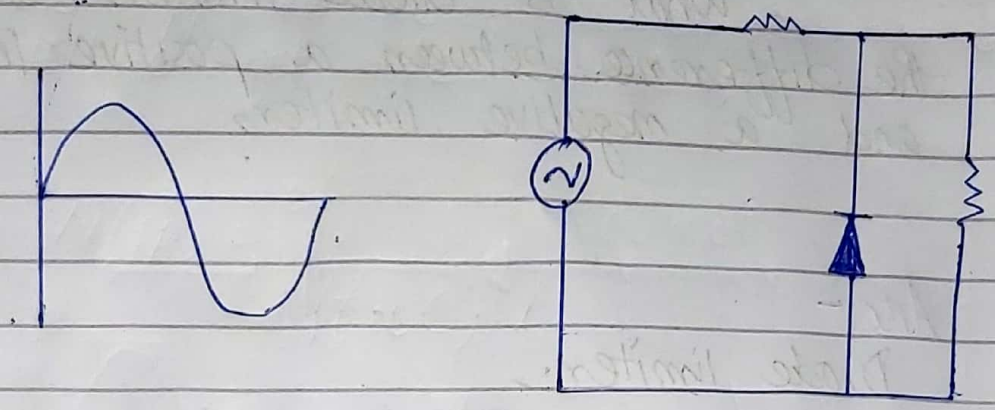


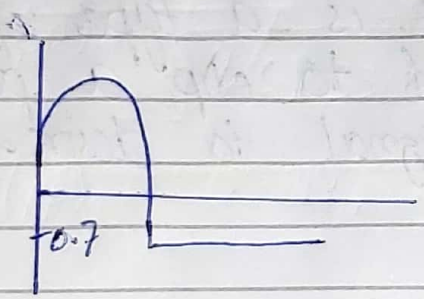
↳ Positive Diode limiter



It is used to clip +ive half cycle of sinusoidal wave

↳ Negative Diode Limiter.





↳ It is used to clip -ive half cycle of a desired level.

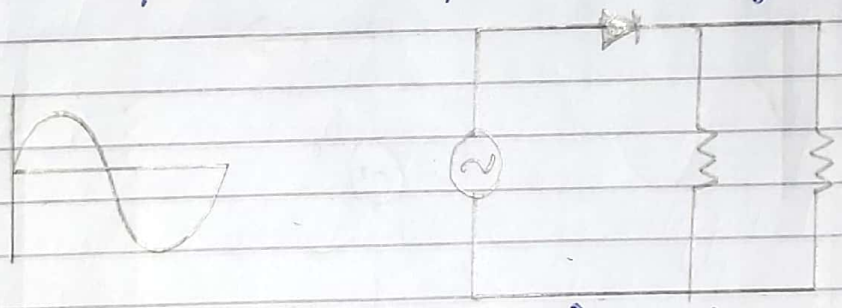
Q No. D:-
What component in a clamping circuit effectively acts as a battery?

Ans D:-
Capacitor effectively act as a battery in clamping circuit.

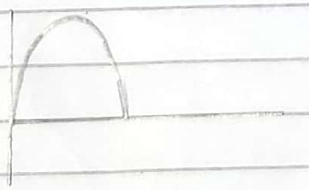
Q No. e:- When a 60Hz sinosidal voltage is applied to the input of a half-wave rectifier, what is the output frequency?

Ans e:-

The output frequency of half wave rectifier is equal as input - This means as input complete one cycle and output also complete one cycle.

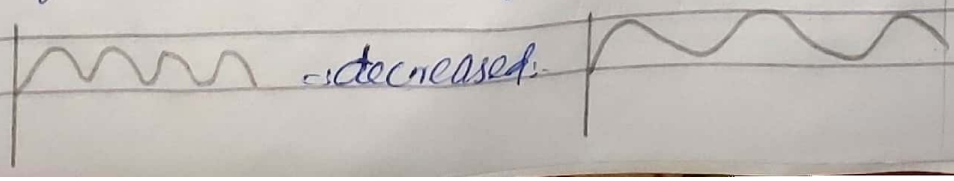


$f_{in} = f_{out}$.



Q No. f:- If the load resistance connected to a filtered power supply is decreased, what happens to the ripple voltage?

Ans:- If the load resistance connected to a filtered power supply decreased the charging and discharging time of capacitor also increases so takes longer time to charge and discharge.



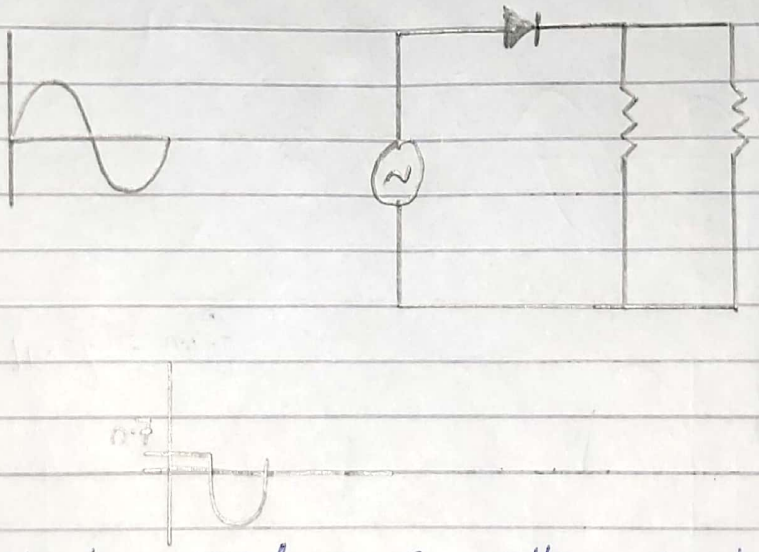
decreased

Q No. 9:-

Discuss the diode limiters and diode clampers differ in terms of their functions?

↳ Diode limiter:-

It is a circuit which is use to clip a sinusiodal waveform at a desired level-

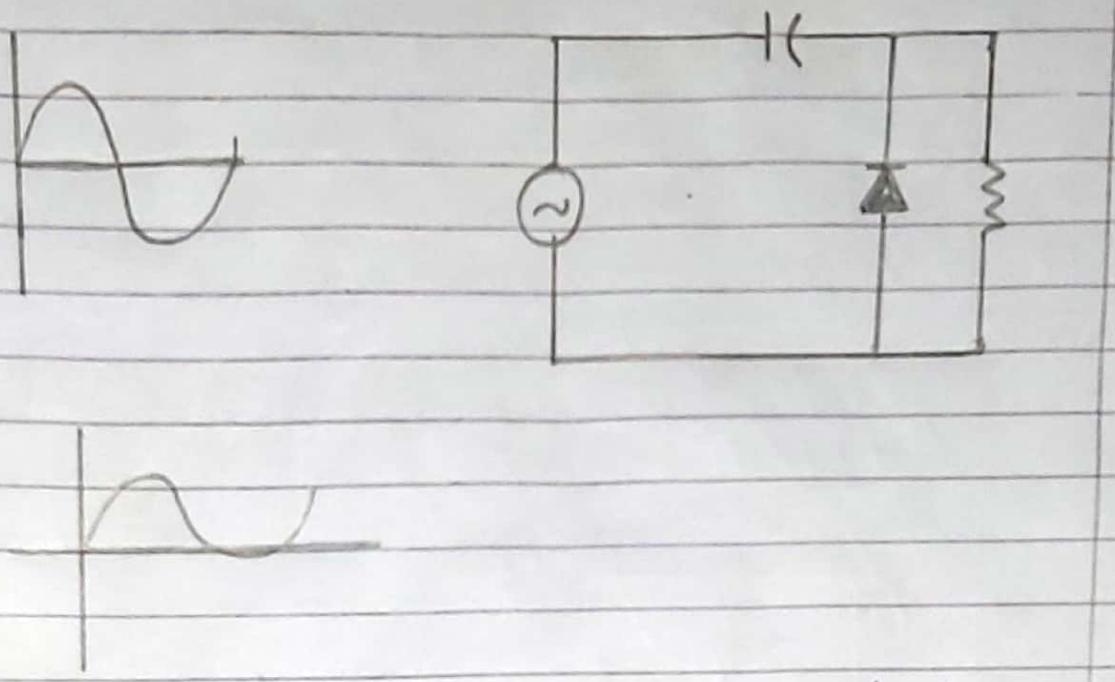


↳ It is used as a voltage regulator to keep the voltage at a desired level.

↳ Diode Clamper:-

Diode clamper is used to add a DC offset to a (+ive) and (-ive) half cycle of a sinusiodal wave form-

It clamps the whole signal at a desired level.



↳ It is used as a voltage doubler.