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Module	Summer
Subject	Electronic Devices and Circuits
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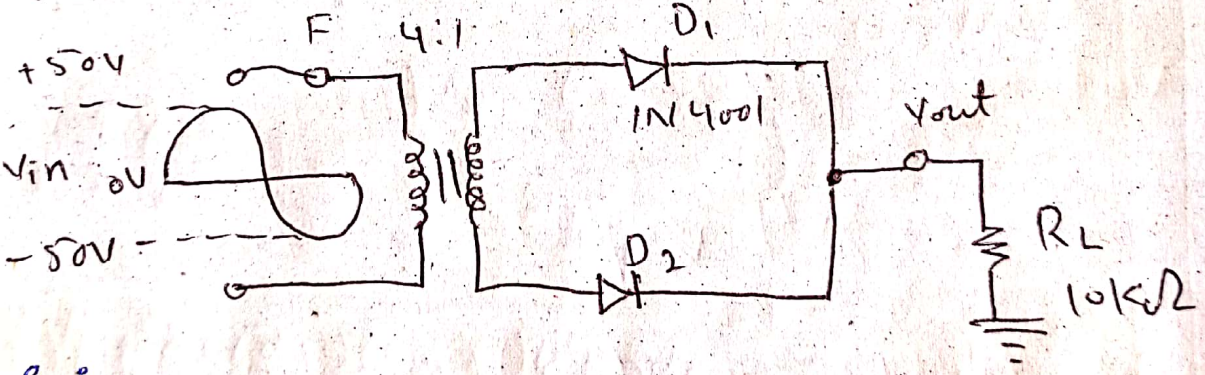
Q no 1 :- For the circuit give in figure 1, answer and ----

(a) what type of circuit This?
(b) what is the total peak secondry voltage?
(c) Find the peak voltage across half of the secondary.
(d) what is the peak current Through each diode?
(e) what minimum PIV rating must The diodes have?



Ans :-

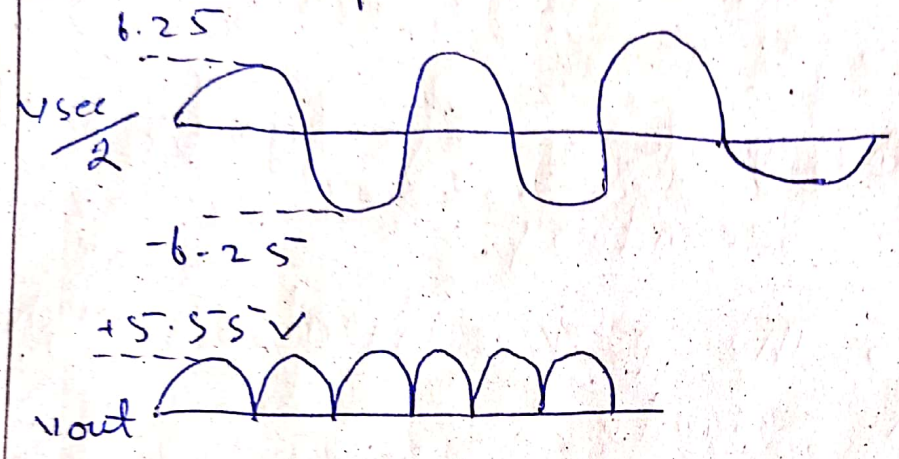
(a) This is a center-Tapped Full-wave Rectifir circuit. ∩∩ → wave forme.

(b) The transformer turns ratio $n = 0.25$

so The total peak secondry voltage is $V_{p(sec)} = n V_{p(Pri)} = 0.25\,(50V)$.

$$V_{p(sec)} = 12.5$$

(c) so There is 6.25 V peak across each half of The secondry with respect to ground. The output load voltage has a peak value of 12.5 V, less The 0.7 drop across The diode.



(d) Peak current through each diode

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

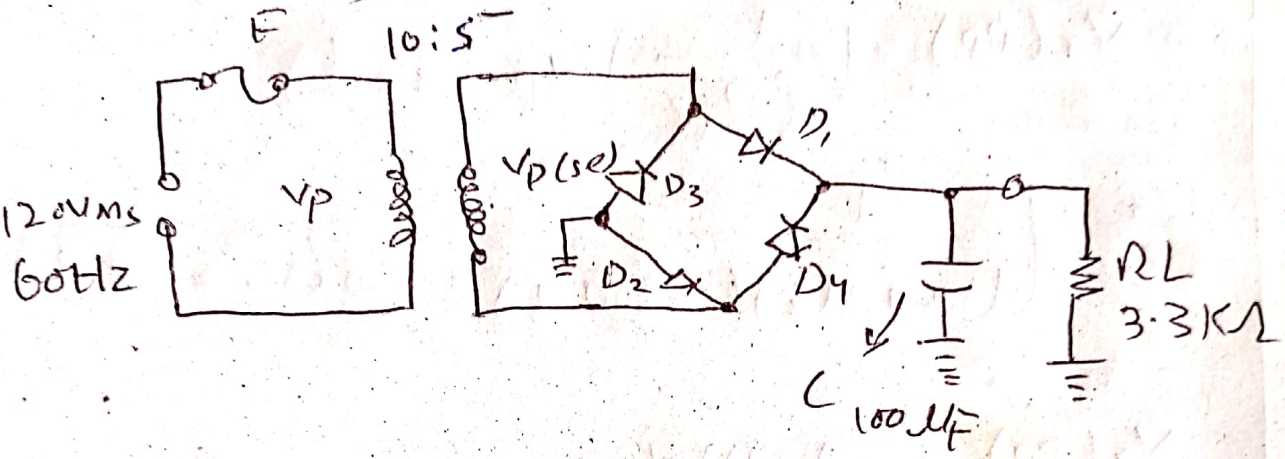
$$I_E = 0.0005\overline{5} \quad (= 0.5\overline{5}5\ mA)$$

(e) Each diode must have a minimum PIV rating of.

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

$$\boxed{PIV = 11.8\ V} \rightarrow \text{Ans.}$$

Q.No 2 :- Determine the ripple factor for the filltered bridge rectifier with a load as indicated in Figure 2



Ans :-

The transformer turns ratio is

$$n = 0.5$$

so the Peak Primary voltage is

$$V_{P(Pri)} = 1.414 V_{RMS} = 1.414(120) = 170V$$

The Peak secondry voltag is

$$V_{P(sec)} = nV_{P(Pri)} = 0.5(170V) = 85V$$

The unfitered Peak full-wave rectified voltage is

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

$$= 85 - 1.4V$$

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

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

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

$$= \left(\frac{1}{(120\,Hz)(3300\,\Omega)(100\times10^{-6}\,F)}\right) 83.6V$$

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

Approximate dc value of the output voltage is determine as follow.

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

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

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

$$V_{DC} = (1 - 0.0126)\, 83.6$$

$$= (0.9874)\, 83.6$$

$$V_{DC} = 82.5^{-}$$

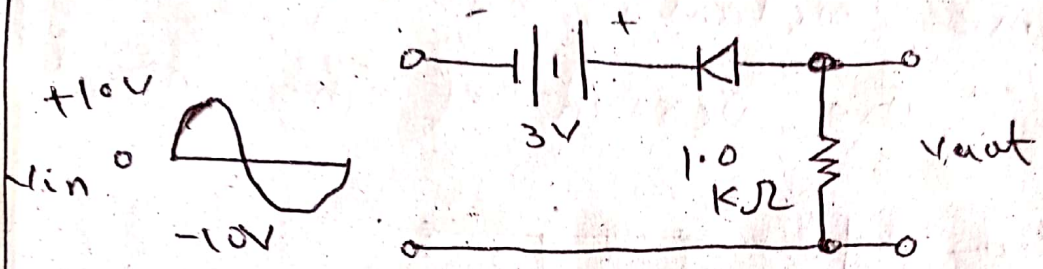
$$V_{o(PP)} = \frac{2.111}{82.5^{-}}$$

$$= 0.025^{-}$$

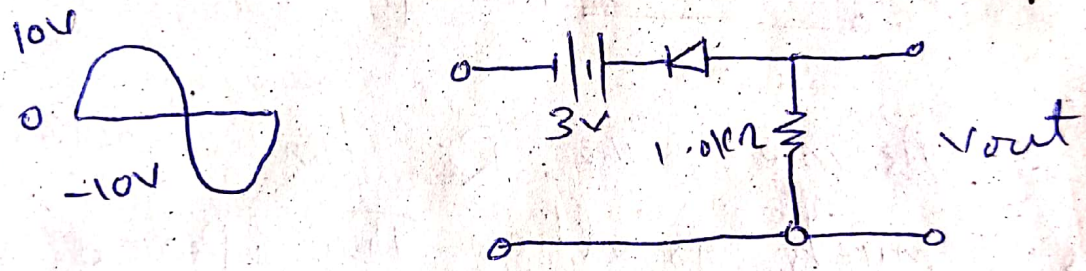
Ans

Resulting ripple factor is

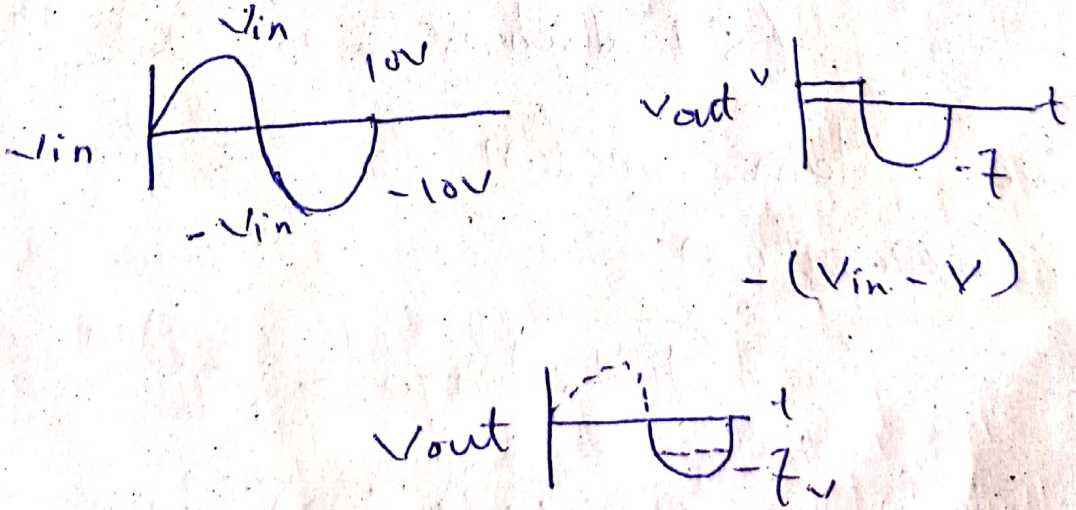
Q No 3:- Determine the output voltage waveform for the circuit given in Figure 3



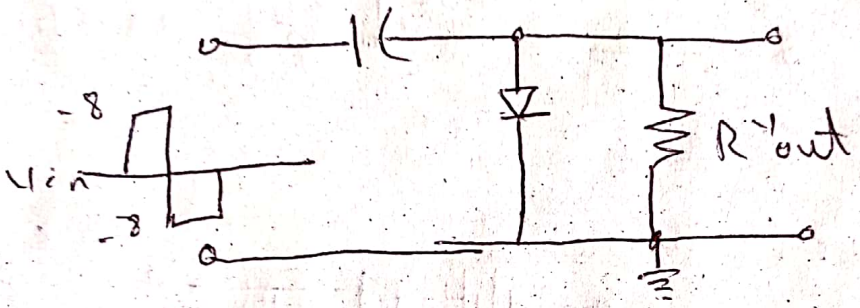
Ans:-



output waveform of clipper circuit



Q.No 4 :- Determine the output voltage waveform for the circuit given in Figure 4. Assume the Ri time constant is much greater Then the period of the input.



Ans:-

Assume the Ri time constant is much greather Than Period of input.

So if we take

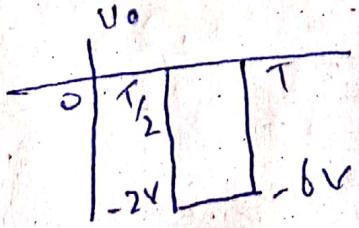
(5T discharge ≥ 8B T/2) Thus we obtain conction for the clamping operation

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

Sol

$$V_o = V_i - V + V_D \quad (0V)$$

T is the Period of in put signeel.

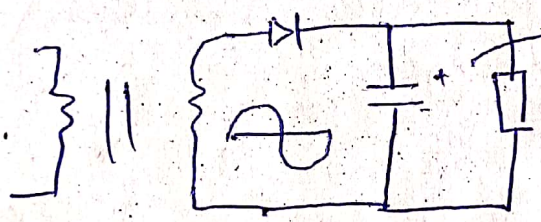


Q.No 5 : Answer The following question.

(a) what is powe supply Filter? and diagram.

A Power supply filter ideally eliminates The fluctuations in The output voltage of a halfwave or full-wave rectifier and produces a constant level dc voltage.

Diagram.



~~~ → Reducing Ripples As capacitor charging and discharging.

(b) n-type and p-type semiconductes

N-type semicanductes :-

when a small amount of pentavalent impurity added to a Pure silicon - crystal. It form N-type semiconductor.

The addition of petavalent impurity produ a large no of free electron in host crystal
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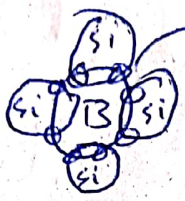
P- type semiconductor :-

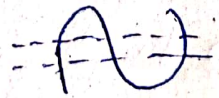
extrinsic semiconductor is formed when a trivelent impurity is added to a pure semiconductor in ~~restut~~ small amount and as a result a large nnmbes of holes creale



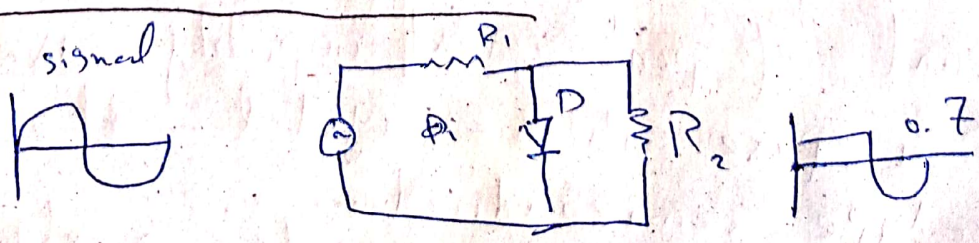
hole Acceptors impurity.

(c). Diode Limites and possitive and -ive limiters.

Diode Limiter :- It is a type of circuit which is designed to clip a part of signal of AC singnal to desired waveform.



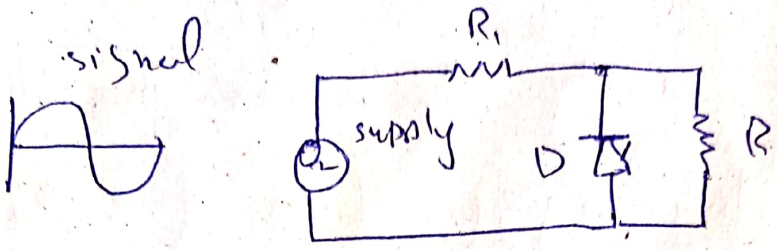
Positive Diode Limiter :-

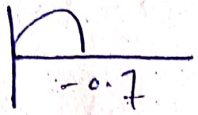


It is used to clip -ive hlof

cycle of sinusoidal wave.

-ive Diode limter :-





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

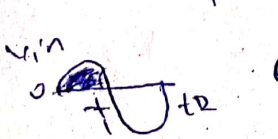
(d) what component in a clamping circuit ----

capacitor effectively act as a battry in a clamping circuit.

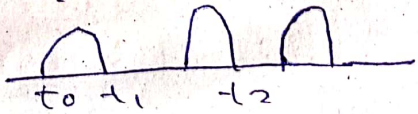
(e) when 60 Hz sinusoidal voltage ----

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

$f_{in} = f_{out}$

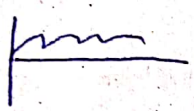
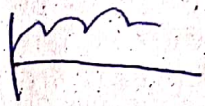


60 Hz half-wave output voltage for Three input



(f) If load ressister connected ----

If The load resister to filtered power supply decreases. The charging and discharging. Time of capacitor also discharging so take longer time to charge and discharge.

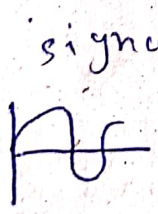
 decraised 

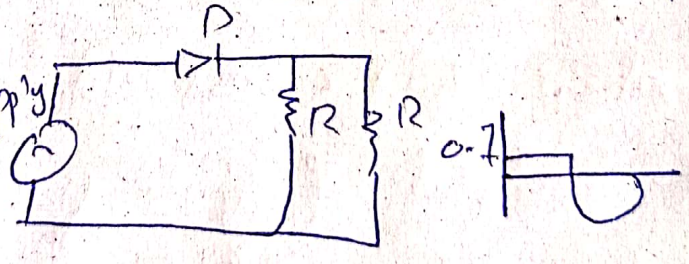
(g) Diode limter and clampers ---

Diode Limiter :-

It is a circuit which is use to clip a sinusiodal wave form at a desired level.

signal

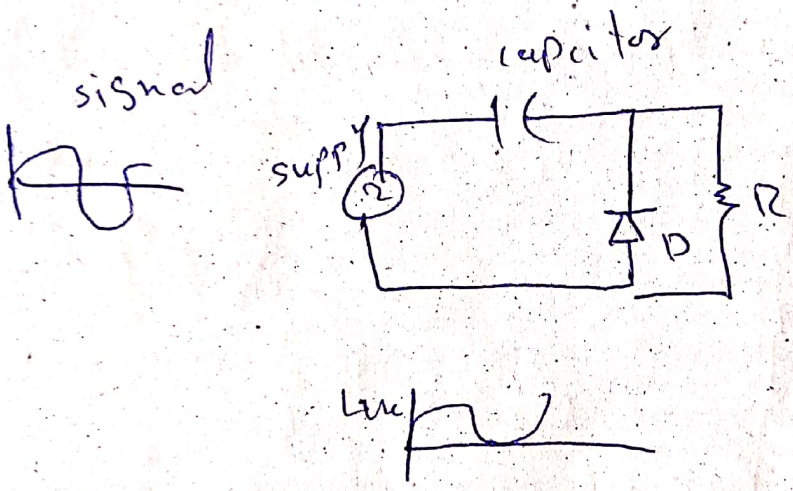




it is used as a voltage regulator to keep The voltage at a desired level.

Diode clamper :-

Diode clamper is used to add a DC offset of a ~~sinusiodal~~ +ive and -ve half cycle of a sinusioded waveform. It clamps The whole signal at a desired level.



It is used as a voltage doubler.