Course : Electronic device and circuit

: Summer Semester

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Signature : 

Q2:- Determine the ripple factor for filtered bridge with a load as indicated in figure - 2

Sol:- the transformer turns ratio n=0.5

the peak primary voltage

$V_{p(pri)} = 1.414\, V_{rms}$

$= 1.414 (120$

$= 170V$

the peak secondary voltage is

$V_{p(sec)} = nV_{p(pri)}$

$= 0.5(170) = 85\ V$

85 V

Unfiltered peak full-wave rectified voltage is

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

$= 85 - 1.4$

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

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

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

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

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

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

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

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

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

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

$$= (0.9874)83.6$$

$$V_{DC} = 82.5$$

Resulting ripple factor is

$$V_{r(pp)} = \frac{2.111}{82.5}$$

$$= 0.025$$

Q.S.No:-

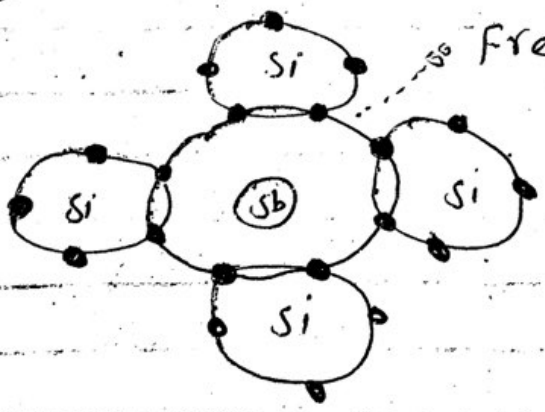
Part (B).

How are n-type and p-type Semiconductors formed?

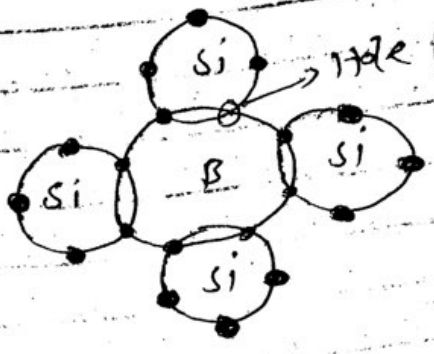
N-type and P-type Semiconductors:-

the Doping of Semiconductors pentavalent impurities Impurity atoms with 5 valence electrons produce n-type semiconductors by Contributing extra electrons. trivalent impurities Impurity atoms with 3 valance electrons produce p-type semiconductors by producing a "hole" or electron deficiency.

N-type Semiconductor:-



P type Semiconductor:-



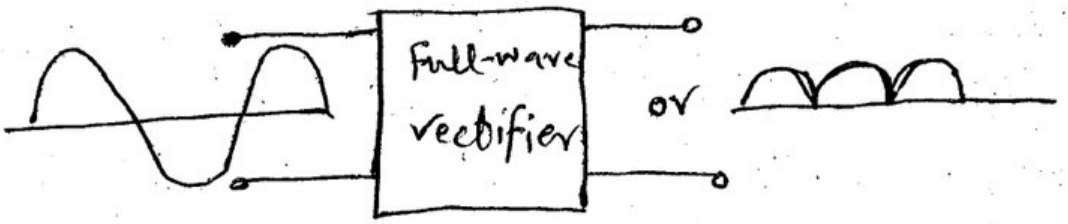
Part (a):-
Power Supply Filter:-

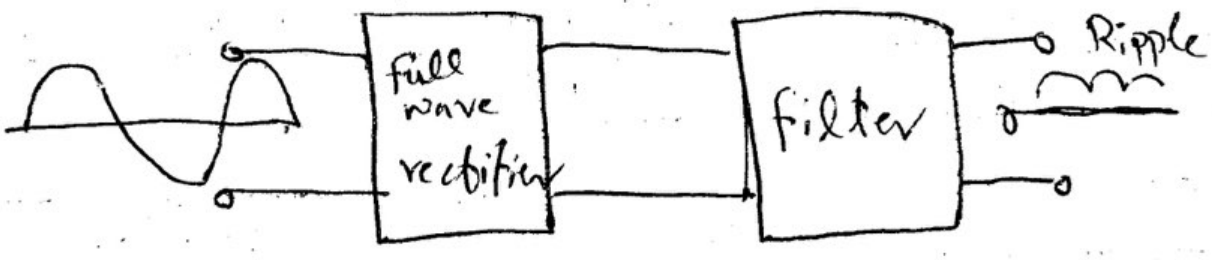
* A power supply filter ideally eliminates the fluctuations in the output voltage of a halfwave or full-wave rectifier and produces a constant-level dc voltage.

* The 60 Hz pulsating dc output of a half-wave rectifier or the 120 Hz pulsating output of a full-wave rectifier must be filtered to reduce the large voltage variations.

* the output of a filter is nearly smoth dc output voltage.

* the small amount of fluctuation in the filter output voltage is called ripple.





Part : C :-

diode Limiter :-

The diode clipper, also known as a diode limiter is a wave-shaping circuit that takes an input waveform and clips or cuts off its top half bottom half or both halves together. This clipping of the input signal produces an output waveform that resembles a flattened version of the input.

* positive Limiter and negative Limiter :-

The series-Negative Limiter limits the negative portion of the input pulse. The difference between a series-negative limiter and a series-positive Limiter is that the diode is

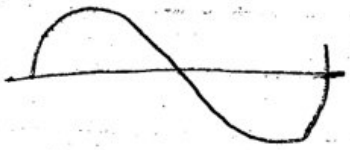
reversed in the negative Limitor... In the parallal Positive Limiter the positive portion of the input signal is Limited when the diode conducts.

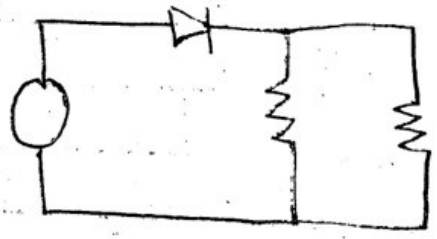
Part (d):-

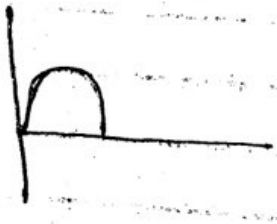
As Vin becomes negative, the capacitor acts as a battery of the same voltage of Vin. the voltage source and the capacitor counteract each other, resulting in a net voltage of zero as seen by the load.

Part (e):-

the output frequency of half wave rectifier is equal as input this means as one input cycle complete at output also complete one cycle



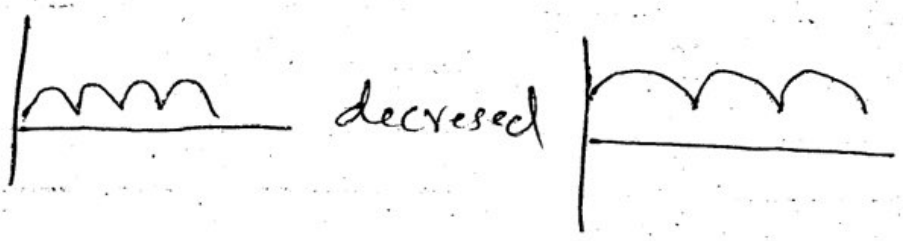




fin = fork

Part (f):-

if the load resistance to filtered power supply decreases the charging and discharging time of capacitor also decreases so takes longer time to charge and discharge

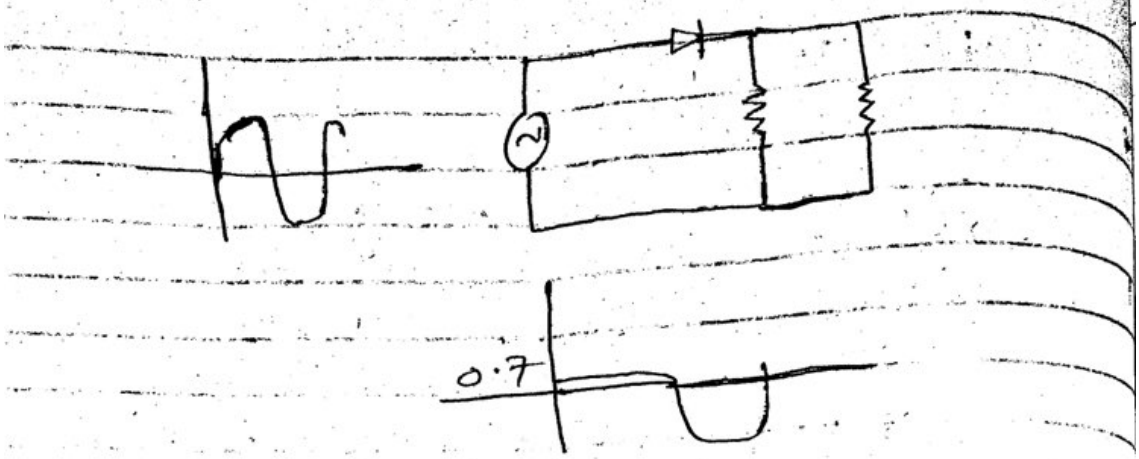


Part (g):-

Difference between diode Limitor & clamper:-

Diode Limiter:-

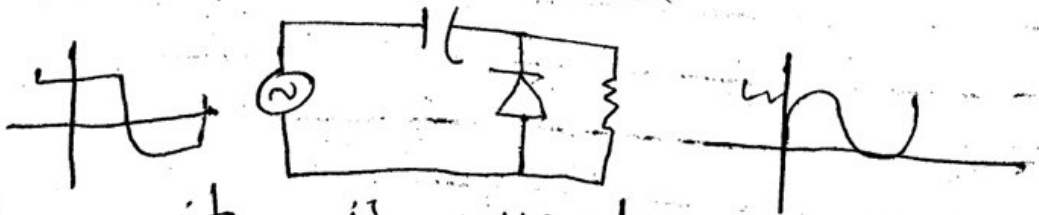
It is a circuit which is use to clip a sinusoidal wave form at a desired level.



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

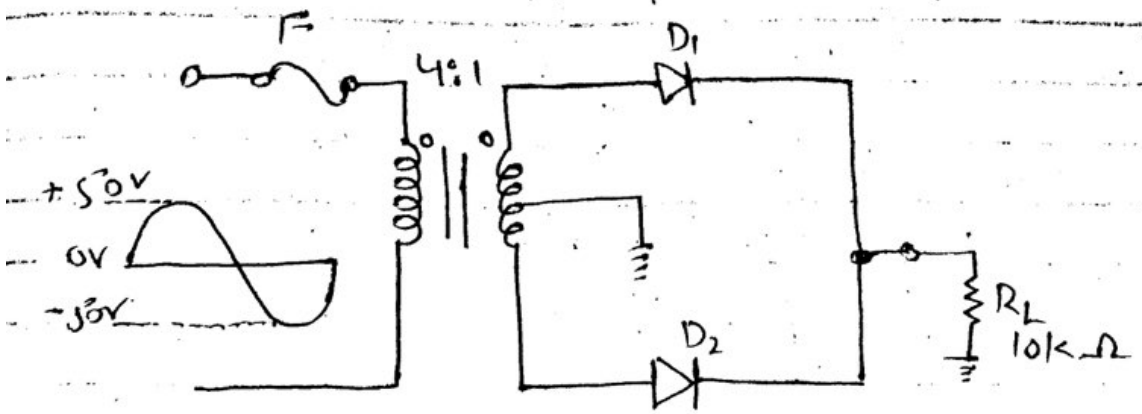
Diod clamper:

Diode clamper is used to add a DC offset to a +ive & -ive half cycle of a sinusiodal waveform
it clamps the whole signal at a desired level



it is used as a voltage doubler.

Q1 g-



Part(a):-
What type of circuit is This?

Ans:- the given figure circuit is center tapped full-wave rectifier transformer circuit.

Part (B)
What is the total peak secondary voltage?

Sol:- the transformer turns ratio, n=0.5
the total peak secondary voltage is.

$V_{p(sec)} = nV_{p(pri)} = 0.25(50V) = \boxed{12.5V}$

Part-(c):-
Find the peak voltage across each half of the secondary

Ans:- there is 6.25 V peak across each half of the secondary with respect to ground. 6.25 - 0.7 which diode drop.

Part-(d) what is the peak current through each diode?

Ans:- the peak current through each diode is

$$If = \frac{Vp(sec) - 0.7}{R_L}$$

$$= \frac{5.55V}{10K\Omega}$$

$$= 0.000555$$

$$= 0.555 mA$$

Part e:-

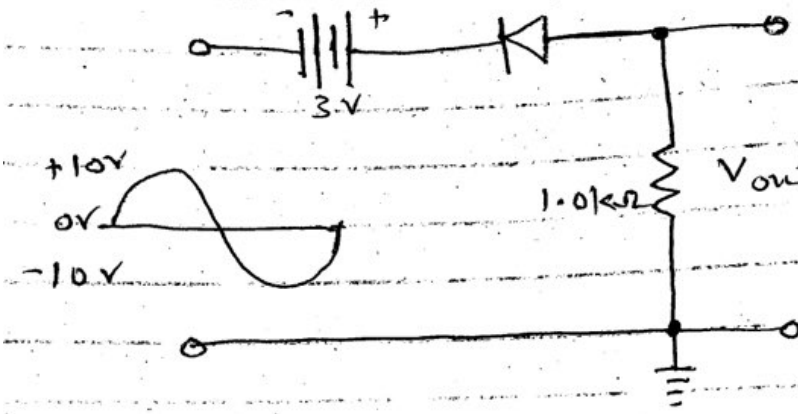
What minimum PIV rating must the diode have?

Ans:- Each diode must have a minimum PIV rating of

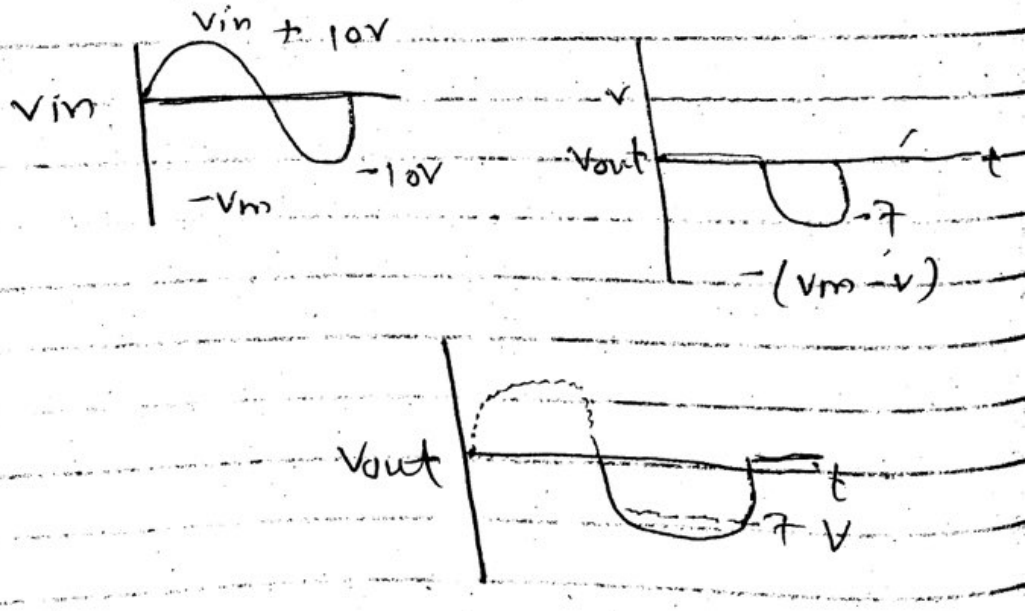
$$PIV = 2V_{p(out)} + 0.7 = 2(5.55V) + 0.7$$

$$= 11.8V$$

Q8:- Determine the output voltage waveform for the circuit given in fig-3

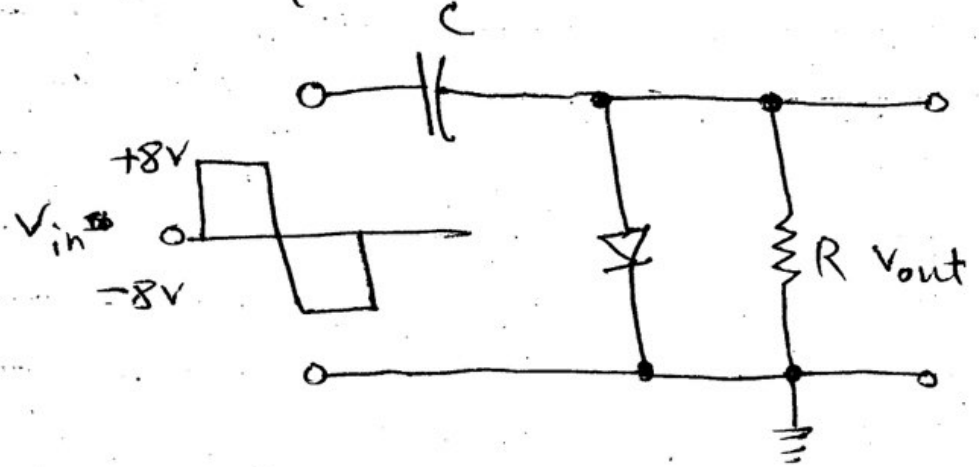


output waveform of clipper circuit.



Q48-

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.



Solution:-

if we take
($5\tau_{discharge} > 50\ T/2$) thus

we obtain Condition for the clamping operation.

$T_{discharge} \geq 5T$

So, $V_o = V_+ - V + V_D(0V)$

∴ this is period of input signal. v_i