MINI PROJECT

Rectifiers : it is a digital, logical circuit which is used to convert the ac signal to the pulsating dc signal. It contains p-n junction diode which conducts the electricity in only forward direction and at the reversed bias it gets off and we get the pulsating dc signal across the load resistance.

Pulsating - in the dc output signal it also contains some components of ac so it is called pulsating signal

FULL WAVE RECTIFIRE - It is the circuit which converts the both (negative and positive } signal into the dc signal so it is called full wave rectifier.

Center tap full wave rectifier it contains two identical diodes which are connected as that at a time only one diode will be In forward bias and another one will be reversed bias the process of converting ac signal to the dc signal is called rectification.

OBJECTIVE - The main objective behind this project are

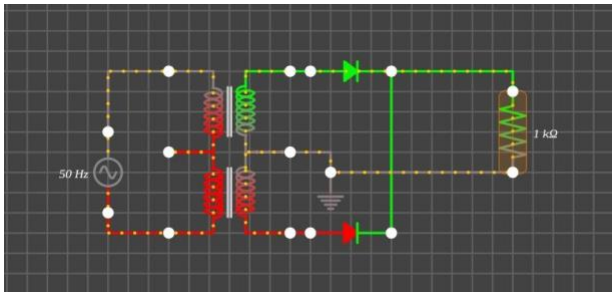
- To learn circuit design.
- To design a rectifier.

REQUIREMENTS

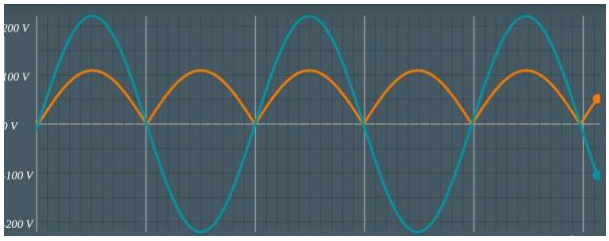
S.no	Name	Range	Quantity
1	DIODES		2
2	Transformer	220v to 18 volts Step down	1
3	Resisters	1k- 10k ohm	1
4	CRO		
5	BREAD BORD		1
6	Ac voltage source	220v 50Hz	1
7	Connecting wires		As required

Principle and WORKING -

It is device which can convert the ac signal to the dc signal. The ac signal supplied to the rectifier is very high so it can damage to the circuits, so there is we use the step down transformer so we change the voltage ⚡220 volts with the 9-18 volts.
Then we connect the both diodes as shown in figure:-



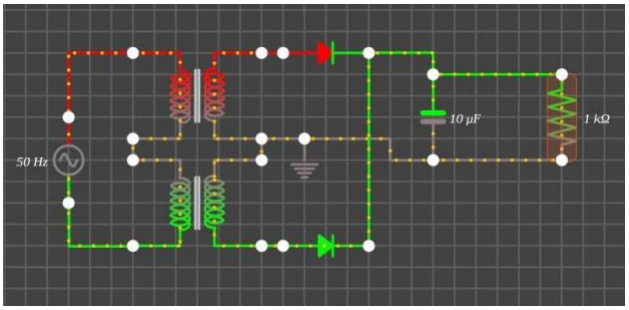
In the positive half cycle of the transformed ac diode 1 will be in the forward bias and diode 2 will be in reversed biased.
And similarly in the negative ☒ half cycle of the transformed ac diode 2 will be in forward bias and the diode 1 will be in the reversed bias .
And a ground supply is connected to the transformer and the load resistance, and diodes are connected with other end of the load resistance.
So that we get a DC voltage signal as shown in figure.

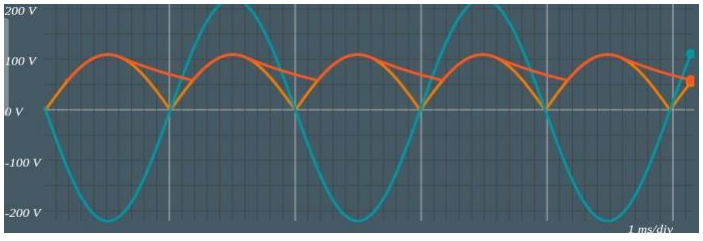


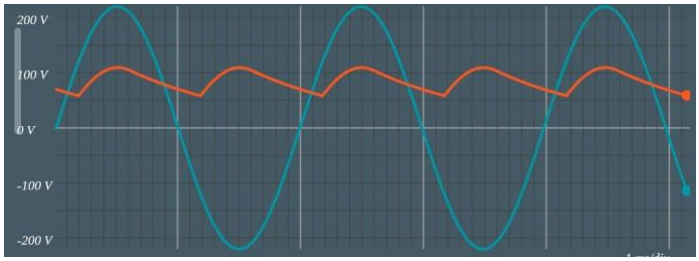
- The blue ● voltage signal shows to the input voltage
- The orange □ voltage shows to the DC output voltage

The out put signal contains the ac component that is called Ripple.
RIPPLE FACTOR – it is the factor which shows the ac component in the dc out put.
To remove the ripple from dc we use some external elements those are inductor, capacitor with various combinations of them.
Fillers:
Capacitive filter:
Here we use capacitor in parallel with the load resistance
The capacitor charges when voltage signal is going 0 to peak, and it discharges the energy when signal is going peak to 0 .
These is how the capacitive filter works with rectifier.

Circuit:
Due to this charging and discharging of the capacitor we get the dc out put as shown bellow:

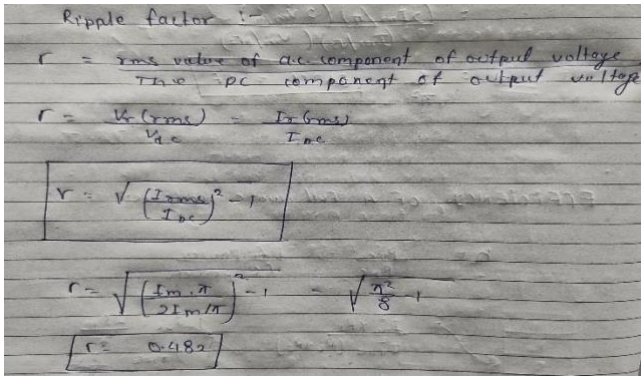






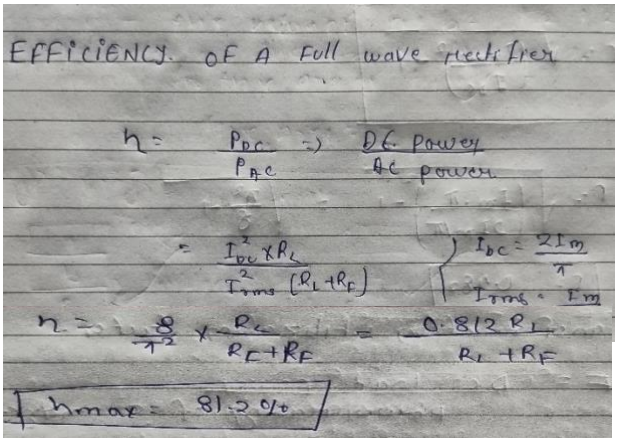
Her the red 🔴 signal shows to the capacitive filtered dc output signal it has less ripple.

Ripple – the value of ac component present in the dc output of the rectifier is called ripple . The smaller value of the ripple factor more effective is the rectifier
Mathematically it can be expressed as:



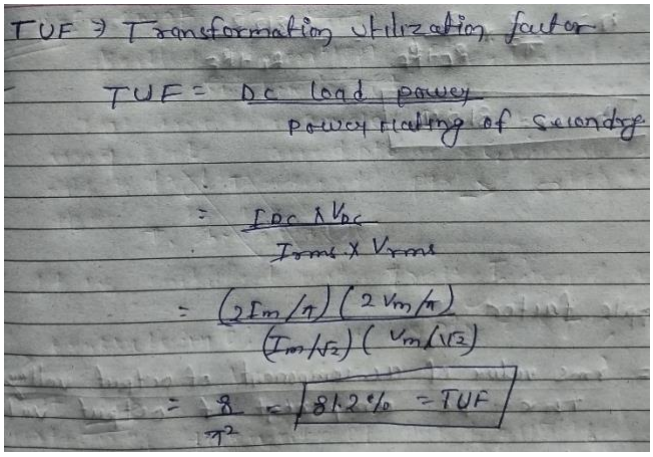
The ideal value of the ripple factor for FWR is 0.482

EFFICIENCY: it is defined as the dc power delivered to the load to the ac input power from the secondary winding of the transformer.
It is denoted by eta symbol



Maximum Efficiency= 81.2%

TUF : It stands for Transformer utilization factor it is defined as the ratio of dc power delivered to the load and the ac rating of the transformer secondary



TUF max = 0.812

AVERAGE –
DC VOLTAGE = $2Vmax/\pi$
DC CURRENT = $2max/\pi$
RMS CURRENT = $Imax/\sqrt{\pi}$
RMS VOLTAGE = $\boldsymbol{Imax/\sqrt{\pi}}$

APPLICATIONS

It is used in most of the digital and electronics circuit.
Due to the none fluctuating or stable voltage supply.
Charger circuit – that is used as power source

Conclusion

We success fully designed the center taped wave rectifier
And calculated the efficiency and the ripple.

Reference :-

Digital electronics (J.B. GUPTA)
Basic electronics (SANJAY SHARMA)