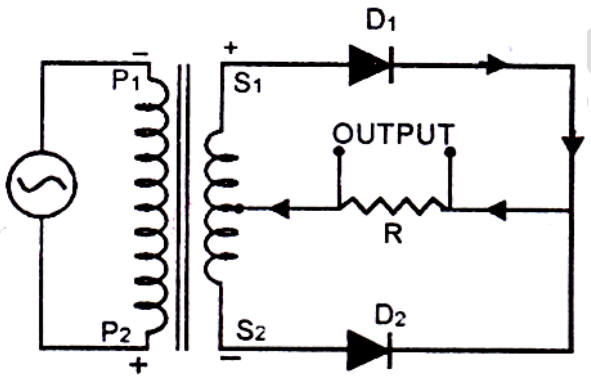
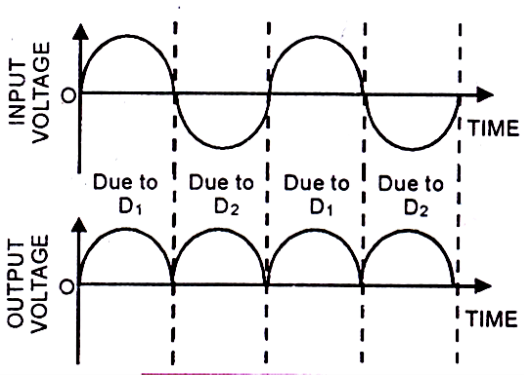
Project Report

Project Name: FULL WAVE RECTIFIER





Submitted To:

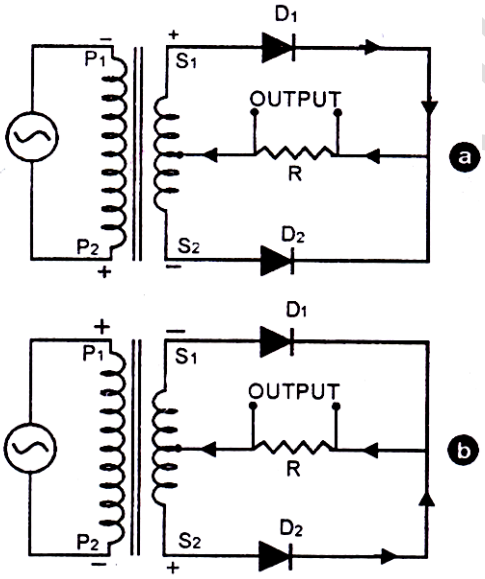
Submitted By:

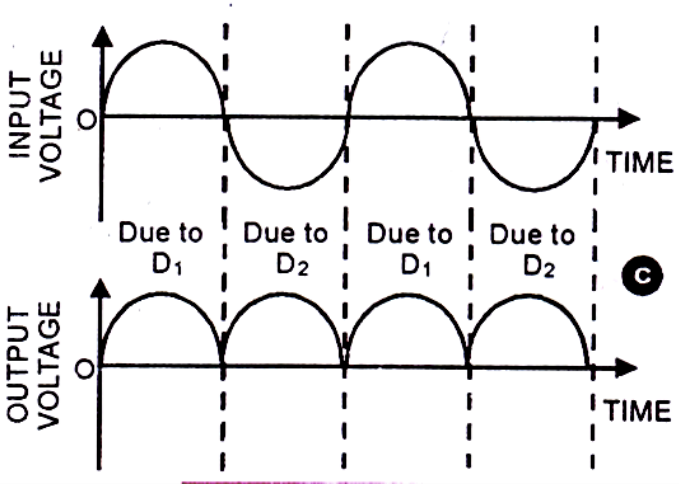
Aim: To Design and simulate Full Wave Rectifier.

Components: Two Ideal p-n diodes, Transformer, Resistance and a bulb (3 volt)

Theory and Construction:

A full wave rectifier is a device which is used to rectify all thealternating current components in an alternating supply and make it purely a direct current. The two alternating halvesof an alternation current are rectified in a full wave rectifierwhich is an advantage over a half wave rectifier. Mostelectronic devices cannot withstand very high voltage or alternatingcurrent due to its intense high power. The use of batteriesin all devices is not practical as their replacement and durability is a huge problem as the device has to be dismantled each time forsuch a replacement. So these rectifiers are used in most of theelectronic devices like TV's, Radios, Chargers,and Lightings etc.





Working:

Positive Cycle

During the positive half of the input A.C., the upper p-n junction diode is forward biased as shown in the figure and the lower p-n junction diode is reverse biased. The forward current flows on account of majority carriers of upper p-n junction diode in the direction shown.

Negative Cycle

During the negative half cycle of input A.C., the upper p-n junction diode is reverse biased and the lower p-n junction is reverse biased. The forward current flows on account of majority carriers of lower p-n junction diode. We observe that during both the halves, current through R flows in the same direction.

- Here in this model 220 volt Alternating voltage is fed as an input to the transformer which in turns converts 220 volt input in to 6 volt output alternating voltage.
- Now this 6 volt alternating voltage is fed as an input to the combination of two diodes which converts this 6 volt alternating voltage in to 6 volt direct voltage
- The LED placed works on 3 volt direct voltage so a resistance is placed in the model which will develop a potential drop of 3 volt and in turns 3 volt output to the LED.

Ripple Factor of a Rectifier

$$\frac{value of a.c. component}{value of d.c. component} = \frac{I_{ac}}{I_{dc}} = \frac{E_{ac}}{E_{dc}}$$

Efficiency of a rectifier

$$\eta = \frac{output.dc.power}{input.a.c.power} \times 100\%$$

Maximum secondary voltage,

$V_{sm} = V_{pm} \times \frac{n_s}{n_p} = \sqrt{2}\, V_{rms} \times \frac{n_s}{n_p}$

Full wave rectified current i.e. mean load current,

$I_{dc} = \frac{2I_0}{\pi}$; $I_{rms} = \frac{I_0}{\sqrt{2}}$

Output d.c.voltage $= I_{dc} X_{RL} = \frac{2I_0}{\pi} X_{RL}$