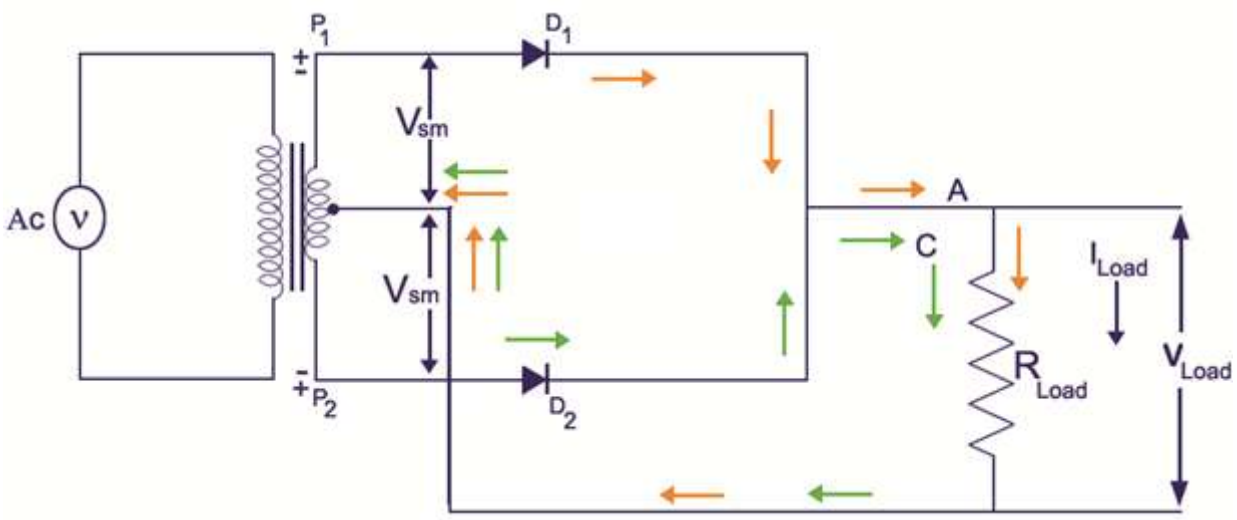
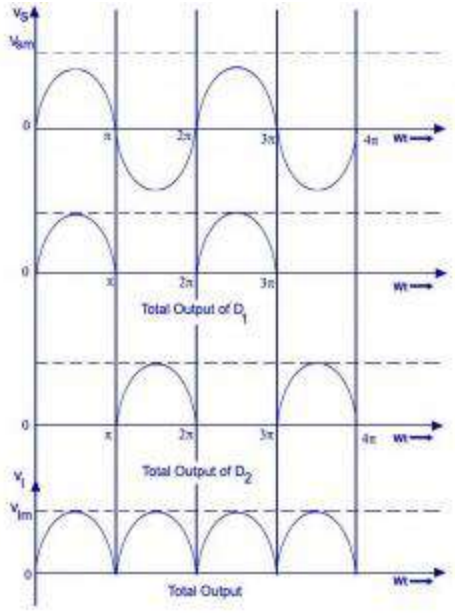
## Centre-Tap Full Wave Rectifier

In the case of centre-tap full wave rectifier, only two diodes are used, and are connected to the opposite ends of a centre-tapped secondary transformer as shown in the figure below. The centre-tap is usually considered as the ground point or the zero voltage reference point.




As shown in the figure, an ac input is applied to the primary coils of the transformer. This input makes the secondary ends $P_1$ and $P_2$ become positive and negative alternately. For the positive half of the ac signal, the secondary point $D_1$ is positive, GND point will have zero volt and $P_2$ will be negative. At this instant diode $D_1$ will be forward biased and diode $D_2$ will be reverse biased. As explained in the Theory of P-N Junction and Characteristics of P-N Junction Diode, the diode $D_1$ will conduct and $D_2$ will not conduct during the positive half cycle. Thus the current flow will be in the direction $P_1$-$D_1$-C-A-B-GND. Thus, the positive half cycle appears across the load resistance $R_{LOAD}$.

During the negative half cycle, the secondary ends $P_1$ becomes negative and $P_2$ becomes positive. At this instant, the diode $D_1$ will be negative and $D_2$ will be positive with the zero reference point being the ground, GND. Thus, the diode $D_2$ will be forward biased and $D_1$ will be reverse biased. The diode $D_2$ will conduct and $D_1$ will not conduct during the negative half cycle. The current flow will be in the direction $P_2$-$D_2$-C-A-B-GND.




Centre-tap Full-wave Rectifier-Waveform

When comparing the current flow in the positive and negative half cycles, we can conclude that the direction of the current flow is the same (through load resistance $R_{LOAD}$). When compared to the Half-Wave Rectifier, both the half cycles are used to produce the corresponding output. The frequency of the rectified output voltage is twice the input frequency. The output that is rectified consists of a dc component and a lot of ac components of minute amplitudes.

1. Peak Inverse Voltage (PIV)

Peak Inverse Voltage (PIV) rating of a diode is important in its design stages. It is the maximum voltage that the rectifying diode has to withstand, during the reverse biased period. At any instant when the transformer secondary voltage attains positive peak value $V_{Smax}$, diodes $D_1$ will be forward biased (conducting) and the diodes $D_2$ will be reverse biased (non conducting). If we consider ideal diodes, the forward biased diodes $D_1$ will have zero resistance. This means voltage drop across the conducting diode will be zero. This will result in the entire transformer secondary voltage being developed across diode $D_2$. Thus PIV of a centre-tap rectifier is

$$PIV = 2V_{Smax}$$