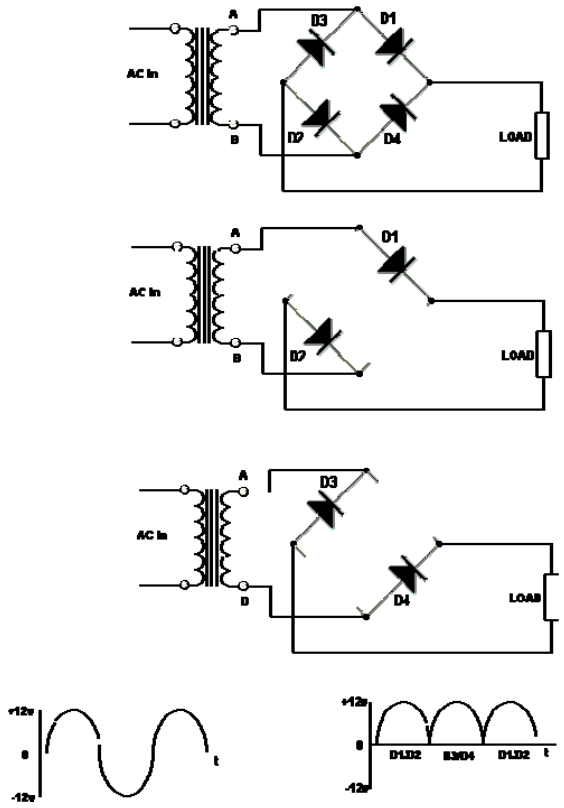
BRIDGE RECTIFIER

The need for centre tapped transformer is eliminated here. Birdge rectifier has four diodes connected to form bridge. The bridge has four arms.



Middle figure During the positive half-cycle

During the negative half-cycle :

Parameters of bridge rectifier :

Average value, I_{dc} *or* $I_{avg} = \frac{2I_m}{\pi}$

Rms value, $I_{rms} = \frac{I_m}{\sqrt{2}}$

$$\text{Form factor} = \frac{I_{rms}}{I_{avg}} = \frac{\pi}{2\sqrt{2}} = 1.11$$

$$\text{Peak factor} = \frac{I_m}{I_{rms}} = \sqrt{2} = 1.414$$

$$\text{Ripple factor} = \frac{I'_{rms}}{I_{avg}} = \frac{8}{9} = 0.483$$

$$\text{Rectification efficiency} = \frac{8}{\pi^2} = 81.2\%$$

Peak inverse voltage :

The PIV across non-conducting diodes is equal to the peak of the transformer secondary voltage (V_m).

During +ve half cycles D1 and D3 are conducting and D2, D4 are non-conducting. Tehrefore voltage drop across D1 and D3 is zero. Then, voltage appearing across D2 non-conducting diode is V_m. Voltage appearing across D4 is also V_m. The PIV across each non-conducting diode is V_m.

Transformer utilization factor :

The current flows thorugh both primary and secondary windings or full sine waveforms. Due to this secondary $TUF = 0.812$.

$$P_{ac}(rated)\text{sec}ondary = \frac{V_m}{\sqrt{2}} \cdot \frac{I_m}{\sqrt{2}}$$
$$TUF(\text{sec}ondary) = 0.812$$
$$TUF(primary) = 0.812$$

$$Average\ TUF = \frac{\text{Pr}imary\ TUR + Secondary\ TUF}{2}$$
$$= 0.812$$

TUF of bridge rectifier (0.812) is higher than TUF of FWR (0.693).

Merits :

1. Centre tapped transformer is not require3d (which is costly bulky)
2. TUF is more than centre-tapped FWR.

De-merits:

1. It requires 4 diodes.

Comparison between various types of rectifiers :

Parameter	HWR	FWR	Bridge Rectifier
No. of diodes	1	2	4
$\mathbf{V_{dc}}$	$\frac{V_m}{\pi}$	$\frac{2V_m}{\pi}$	$\frac{2V_m}{\pi}$
$\mathbf{V_{rms}}$	$\frac{V_m}{2}$	$\frac{V_m}{\sqrt{2}}$	$\frac{V_m}{\sqrt{2}}$
Ripple factor	1.21	0.482	0.482
Efficiency	40.6	81.2	81.2
PIV	V_m	$2V_m$	V_m
TUF	0.287	0.693	0.812
Form factor	1.57	1.11	1.11
Peak factor	2	$\sqrt{2}$	$\sqrt{2}$