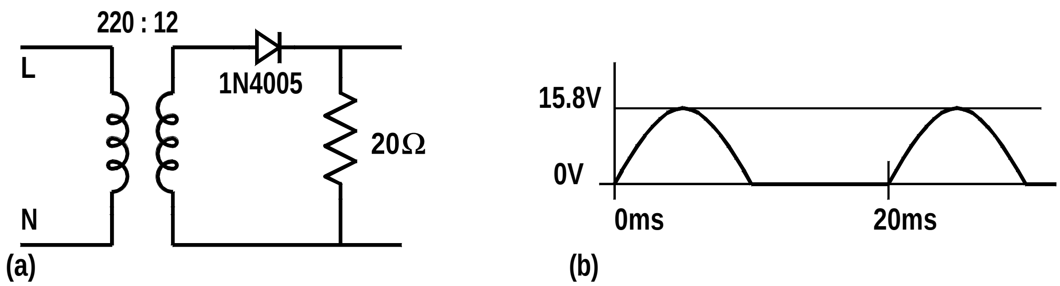
- A single diode, used as a rectifier, gives half wave rectification.

- Four diodes in a bridge rectifier give full wave rectification.

- Ripple voltage from a smoothed full wave rectifier $= \frac{I}{2 \times f \times C}$

Output voltage from half wave rectifier?



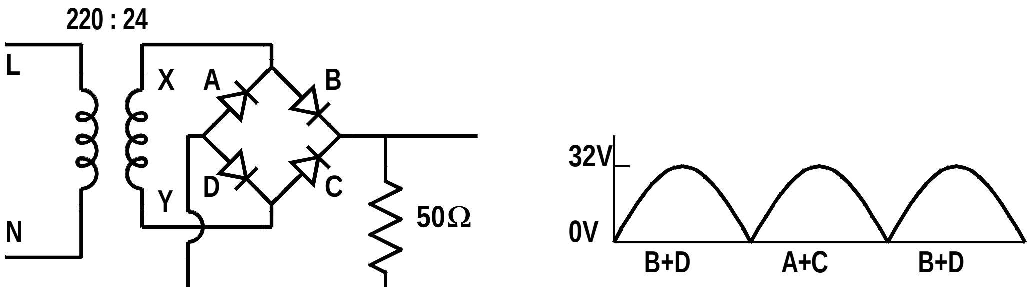

Output across load resistor $R_L = 20\Omega$
Positive half cycles of the transformer output
Minus the voltage drop across the diode.

$$V_{PEAK} = 1.4 \times V_{RMS} = 1.4 \times 12V = 16.8V$$

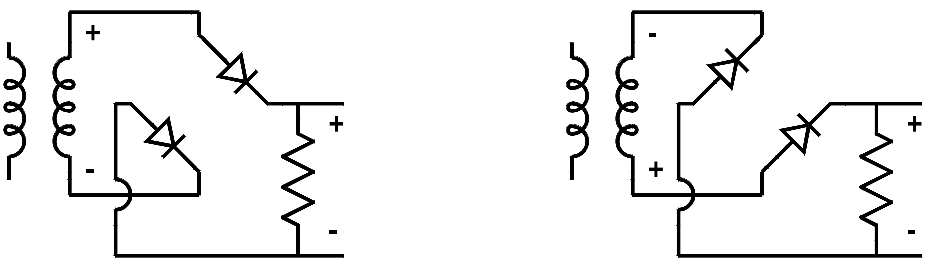
$$16.8V = 0.7V + 0.4 \times I + 20 \times I$$

$$\text{which gives} \quad I = \frac{16.8 - 0.7}{20.4} = 0.79A$$

$$V_{out\ max} = 20 \times 0.79 = 15.8V$$




(a) (b)




(a) (b)

Bridge rectifier output?
Two effective circuits for two half cycles.

$V_{peak} = 24 \times 1.4 = 2 \times .7 + 2 \times I \times R_B + I \times 50\Omega$

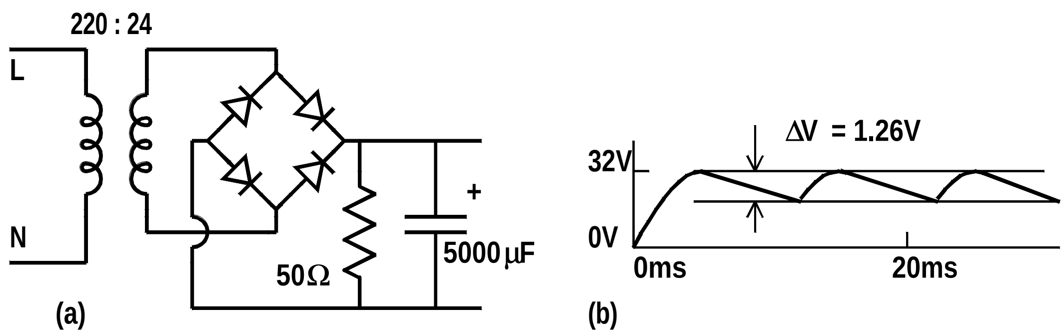
If $R_B = 0.4\Omega$, $I_{peak} = 0.63A$

$$V_{out\ peak} = 31.7V \quad \text{across the } 50\Omega$$

Advantage of the full wave rectifier

Less smoothing is required to convert the output to a DC.

Smaller transformer required
Less weight
Lower cost




$$I_{out} = \frac{V_{out}}{R_L}$$

Charge out of the capacitor

$$\Delta Q = I_{out} \times \text{time} = \frac{I_{out}}{2 \times f}$$

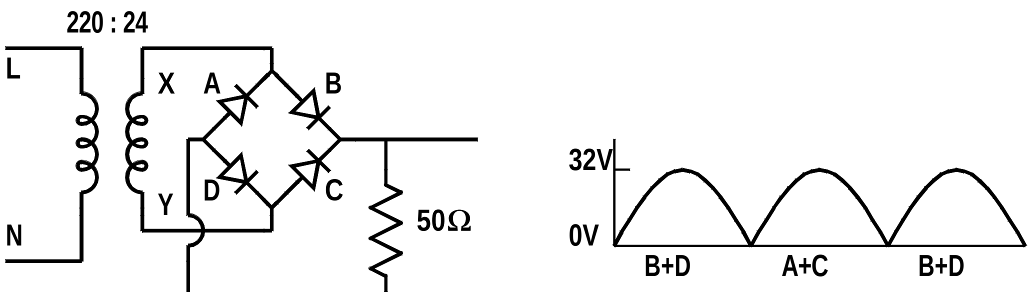
$$\Delta Q = C \times \Delta V$$

Gives a ripple voltage

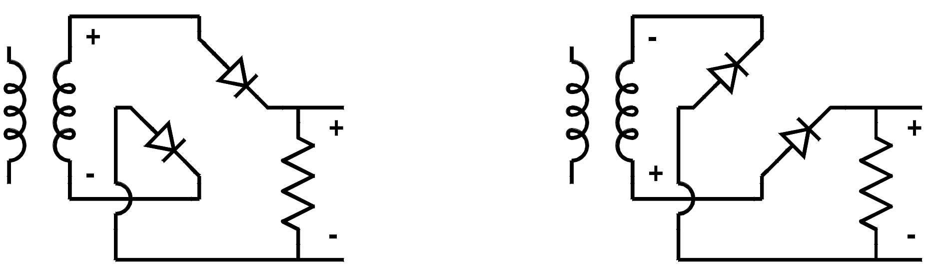
$$\Delta V = \frac{\Delta Q}{C} = \frac{I_{out}}{2 \times f \times C}$$

$$I_{out} = \frac{31.7V}{50\Omega} = 0.63A$$

$$\Delta V = \frac{I_{out}}{2 \times f \times C} = \frac{0.63}{2 \times 50 \times 5 \times 10^{-3}} = 1.26V$$




(a) (b)




(a) (b)