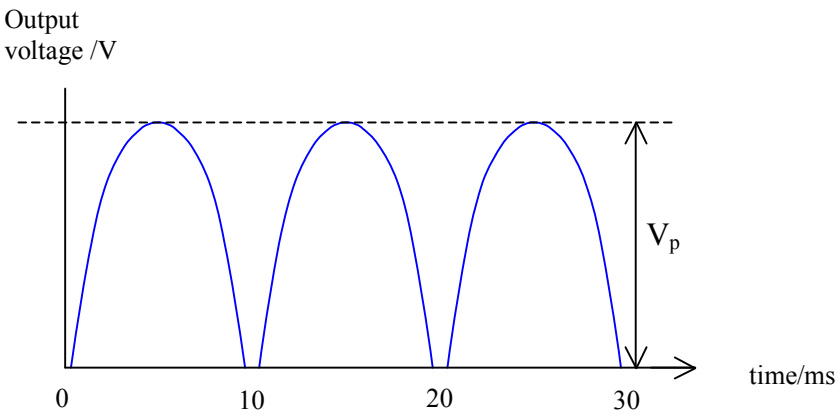
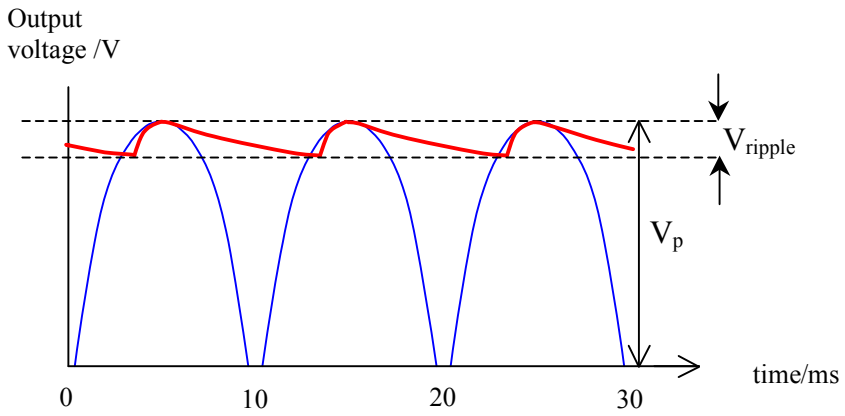
Calculating Ripple Voltage (V_{ripple})

The output from a full-wave bridge rectifier looks like this:



If we add a smoothing capacitor the capacitor charges up to the peak value of voltage and the output stays steady at this value … until you connect a load to the power supply (R_L). Now the output will look like this:



As the output voltage from the bridge drops the capacitor discharges through the load and so a **ripple voltage, V_{ripple}**, appears on the output from the supply.

The size of this voltage depends on the load resistance, R_L, the size of the smoothing capacitor, C, and the peak value of the output voltage, V_p, and is given by:

$$V_{ripple} = \frac{V_p}{R_L\, C} \times \Delta t$$

where Δt is the time between successive peaks of the output waveform from the rectifier circuit. This will be 10ms if the ac frequency is 50Hz and a full-wave bridge rectifier circuit is used. (But ***20ms*** if a half-wave rectifier circuit is used; the question could specify a ***different supply frequency***, eg 60Hz, which would also affect Δt.)

This formula is an approximation and assumes that the ripple voltage is small. If the ripple voltage exceeds ~10% this formula becomes increasingly inaccurate.