To reduce a 5 V signal to 2 V at 500 Hz using a first-order RC low-pass filter, we need to determine the cutoff frequency f_c such that the filter attenuates the signal appropriately.

For a first-order RC low-pass filter, the gain at frequency f is given by:

$$|H(f)| = \frac{1}{\sqrt{1 + \left(\frac{f}{f_c}\right)^2}}$$

We require:

$$|H(500\,\text{Hz})| = \frac{2}{5} = 0.4$$

Solving for f_c:

$$0.4 = \frac{1}{\sqrt{1 + \left(\frac{500}{f_c}\right)^2}}$$

$$\sqrt{1 + \left(\frac{500}{f_c}\right)^2} = \frac{1}{0.4} = 2.5$$

$$1 + \left(\frac{500}{f_c}\right)^2 = 6.25$$

$$\left(\frac{500}{f_c}\right)^2 = 5.25$$

$$\frac{500}{f_c} = \sqrt{5.25} \approx 2.291$$

$$f_c = \frac{500}{2.291} \approx \boxed{218.3\,\text{Hz}}$$

Therefore, the filter should be designed with a cutoff frequency of approximately 218 Hz to achieve the desired attenuation at 500 Hz.