



The filter as seen here is a lowpass filter. A lowpass filter is one in which the output of an RC circuit is taken off the Capacitor.

To obtain the cutoff frequency (ω_c), we first obtain the transfer function $H(\omega)$.

$$H(\omega) = \frac{V_o}{V_i}$$

$$Z = \frac{1}{j\omega C}, R = R$$

$$H(\omega) = \frac{\frac{1}{j\omega C}}{R + \frac{1}{j\omega C}}$$

$$= \frac{\frac{1}{j\omega C}}{\frac{j\omega RC + 1}{j\omega C}}$$

$$H(\omega) = \frac{1}{1 + j\omega RC}$$

Cutoff frequency ω_c , is obtained by equating the magnitude of the transfer function to $\frac{1}{\sqrt{2}}$

$$H(\omega_c) = \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{1^2 + (j\omega RC)^2}} = \frac{1}{\sqrt{1 + \omega^2 R^2 C^2}}$$

Now by comparison

$$2 = 1 + \omega^2 R^2 C^2$$

$$\omega^2 R^2 C^2 = 2 - 1$$

$$\omega^2 R^2 C^2 = 1$$

$$\therefore \omega RC = 1$$

$$\omega_c = \frac{1}{RC}$$