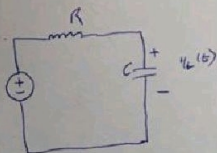


Circuit Theory

∴ The transfer function

$$H(\omega) = \frac{V_o}{V_i} = \frac{V_{out}}{V_{in}} = \frac{1}{1 + j\omega RC}$$

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



$$H(0) = 1$$

Hence the circuit is a low pass filter

$$H(\omega) = 0$$

by setting the magnitude of $H(\omega)$ equals $1/\sqrt{2}$ to obtain cut-off frequency

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

$$\frac{1}{\sqrt{1 + \omega^2 R^2 C^2}} = \frac{1}{\sqrt{2}}$$

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

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

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

$$\omega RC = \sqrt{1}$$

$$\omega RC = 1$$

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