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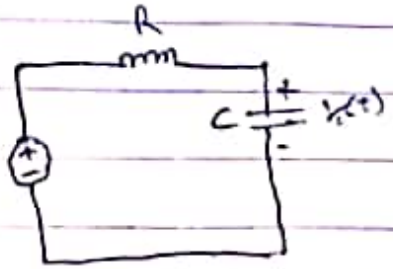
17/ENG04/068
Elect/Elect

- A typical resonance filter is formed when the output of an RC is turned off in a circuit as shown below

Therefore, the transformer

$$H(\omega) = \frac{V_1}{V_2} = \frac{\frac{1}{j\omega C}}{R + \frac{1}{j\omega C}}$$

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



$H(\omega) = 1$

$H(\infty) = 0$

i) Hence the circuit is a low pass filter

By setting the magnitude of $H(\omega)$ equals $\frac{1}{\sqrt{2}}$ to obtain cut of frequency

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

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

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

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

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

$$(\omega_c RC) = \sqrt{1}$$

$$\omega_c RC = 1$$

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