

Assignment

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

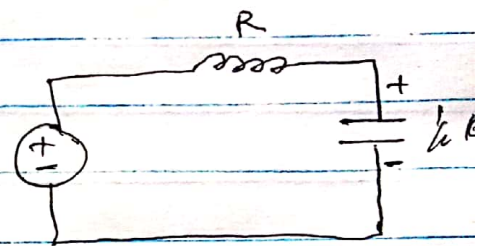
∴ The transfer function

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

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

$$H(\omega) = 1$$

$$H(\infty) = 0$$



i) Hence the circuit is a low pass filter

By setting the magnitude of $H(\omega)$ equal to $1/\sqrt{2}$ to obtain the value of frequency

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

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

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

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

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

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

$$\omega_c RC = 1$$

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