

OKPOLA Christopher Chibwezo
Circuit theory Assignment

PIE21068
COMPUTER ENG

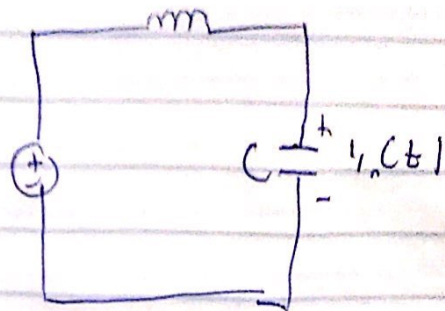
- A -

Q

A typical passive filter is formed when the output of an AC source is connected in a circuit as shown below.
This transfer function

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

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$$H(0) = 1$$

$$H(\infty) = 0$$

(i) Hence the circuit is a low pass filter

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

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

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

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

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

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

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

$$\omega_c RC = 1$$

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