Name; KEVIN JOHNNIECHAZ AGUMA

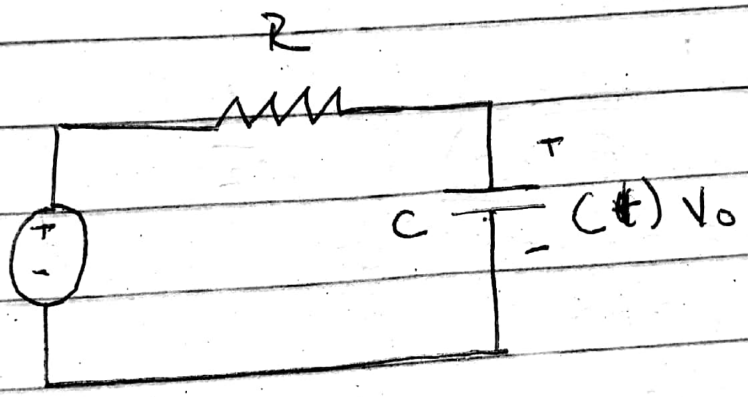
MATRIC; 12/ENG05/004

DEPT; MECHATRONICS ENGINEERING

Course; ENG322

Demonstrate the type of filter shown below and show that its cutt off frequency

$$Wc = 1/RC$$



Soln

its a low pass filter

$$H(V) = \frac{Vc}{Vi} = \frac{1/jwc}{R + 1/jwc}$$

$$\frac{1}{jwc} \times \frac{1}{R + 1/jwc}$$

$$= \frac{1}{1 + RjwC}$$

$$H(0) = 1$$

$$H(w) = 0$$

(R)

The cut off frequency, ω_c

$$|H(\omega)| = \left| \frac{1}{SRC+1} \right| = \frac{1}{\sqrt{2}}$$

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

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

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

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

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

$$\Rightarrow \omega = \frac{1}{RC}$$ //