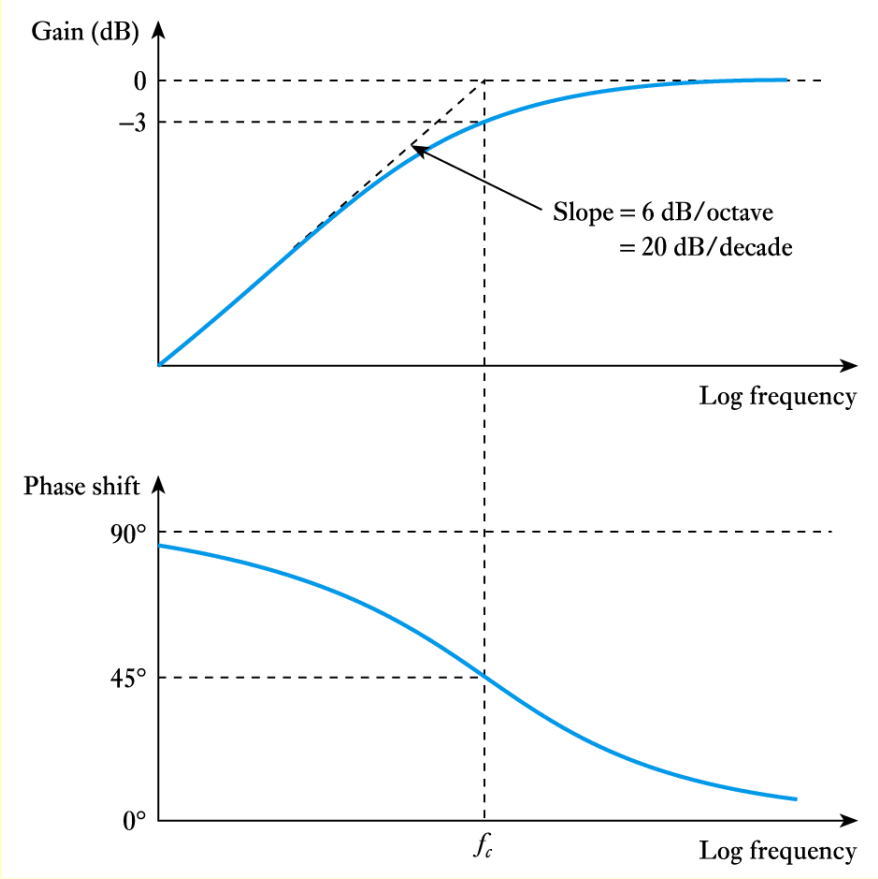
UNIT-5

(Lecture-4)

Frequency Response of High-Pass Network

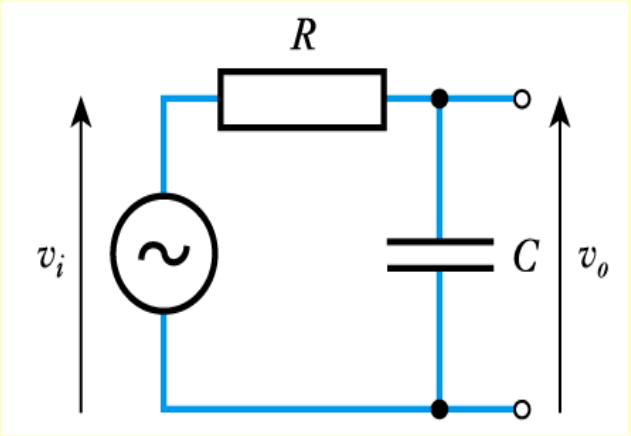
- Frequency response of the high-pass network
  - the gain response has two *asymptotes* that meet at the cut-off frequency
  - figures of this form are called **Bode diagrams**



A Low-Pass *RC* Network

- Transposing the *C* and *R* gives

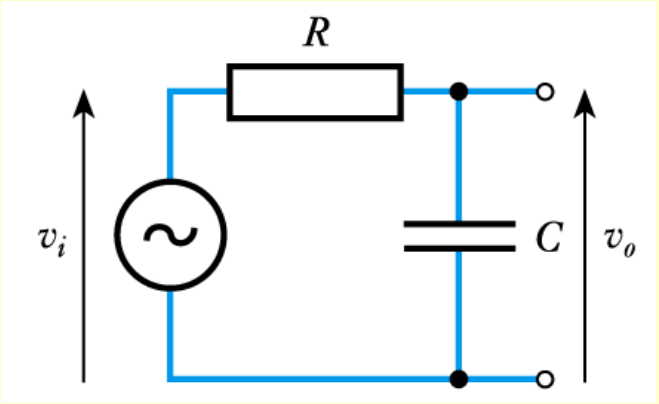
$$\frac{v_o}{v_i} = \frac{\mathbf{Z_C}}{\mathbf{Z_R} + \mathbf{Z_C}} = \frac{-\mathrm{j}\dfrac{1}{\omega C}}{R - \mathrm{j}\dfrac{1}{\omega C}} = \frac{1}{1 + \mathrm{j}\omega CR}$$



- At high frequencies
  - ω is large, voltage gain $\rightarrow 0$
- At low frequencies
  - ω is small, voltage gain ≈ 1

A Low-Pass *RC* Network

- A similar analysis to before gives



$$|\text{Voltage gain}| = \frac{1}{\sqrt{1+(\omega CR)^2}}$$

- Therefore when, when $\omega CR = 1$

$$|\text{Voltage gain}| = \frac{1}{\sqrt{1+1}} = \frac{1}{\sqrt{2}} = 0.707$$

- Which is the cut-off frequency