

Slide 35:

1 Bell = 10 decibels (when dealing with power) = 10-fold increase (multiplication) of the value (square, power)

Note: For the actual signal (not the power), this is a 20-fold increase = 20 decibels

Observations 1 on Bode magnitude curve asymptotes:

$$\text{Normalized TF} = \frac{1}{\tau s + 1} \rightarrow \frac{1}{\tau j\omega + 1}$$

Low frequency asymptote: Horizontal line through magnitude ratio 1 (0 dB)

High frequency asymptote: $\frac{1}{\tau\omega} \rightarrow$ In decade-dB scale, line of slope -20dB/decade.

These two asymptotes intersect at $\frac{1}{\tau\omega} = 1 \rightarrow \omega = \frac{1}{\tau}$

This is the *corner frequency*.

Observation 2 on Bode magnitude curve:

At half-power level (-3 dB): $\frac{1}{|\tau j\omega + 1|} = \frac{1}{\sqrt{2}} \rightarrow \tau^2 \omega^2 + 1 = 2 \rightarrow \tau\omega = 1$

This is the ***half-power bandwidth*** or ***cut-off frequency***

Note: This is the same point as in Observation 1 (corner frequency)