

King Fahd University of Petroleum & Minerals
 Electrical Engineering Department
 EE205: Electric Circuits II (082)
Quiz 6: Filters and Bode Plots

-1 points for not writing your serial #

Name: **Key**

For the given transfer function: $H(s) = \frac{s^2 + 13s + 30}{3s(s + 100)}$

Make Straight-Line amplitude plot for the given transfer function. **Show your steps (9 points)**

What is the type of the filter? **(1 point)** From the transfer function and the amplitude plot (band reject filter)

For your benefit the phase is also shown

a) $H(s) = \frac{(s + 3)(s + 10)}{3s(s + 100)}$

$H(j\omega) = \frac{(j\omega + 3)(j\omega + 10)}{3j\omega(j\omega + 100)}$

$H(j\omega) = \frac{30(1 + \frac{j\omega}{3})(1 + \frac{j\omega}{10})}{300j\omega(1 + \frac{j\omega}{100})}$
 $= \frac{(1 + \frac{j\omega}{3})(1 + \frac{j\omega}{10})}{10j\omega(1 + \frac{j\omega}{100})}$

$20 \log_{10} |H(j\omega)| = 20 \log_{10} |1 + \frac{j\omega}{3}|$
 $+ 20 \log_{10} |1 + \frac{j\omega}{10}|$
 $- 20 \log_{10} |j\omega| - 20 \log_{10} |1 + \frac{j\omega}{100}|$
 $\theta(j\omega) = \tan^{-1} \frac{\omega}{3} + \tan^{-1} \frac{\omega}{10} - 90^\circ - \tan^{-1} \frac{\omega}{100}$

