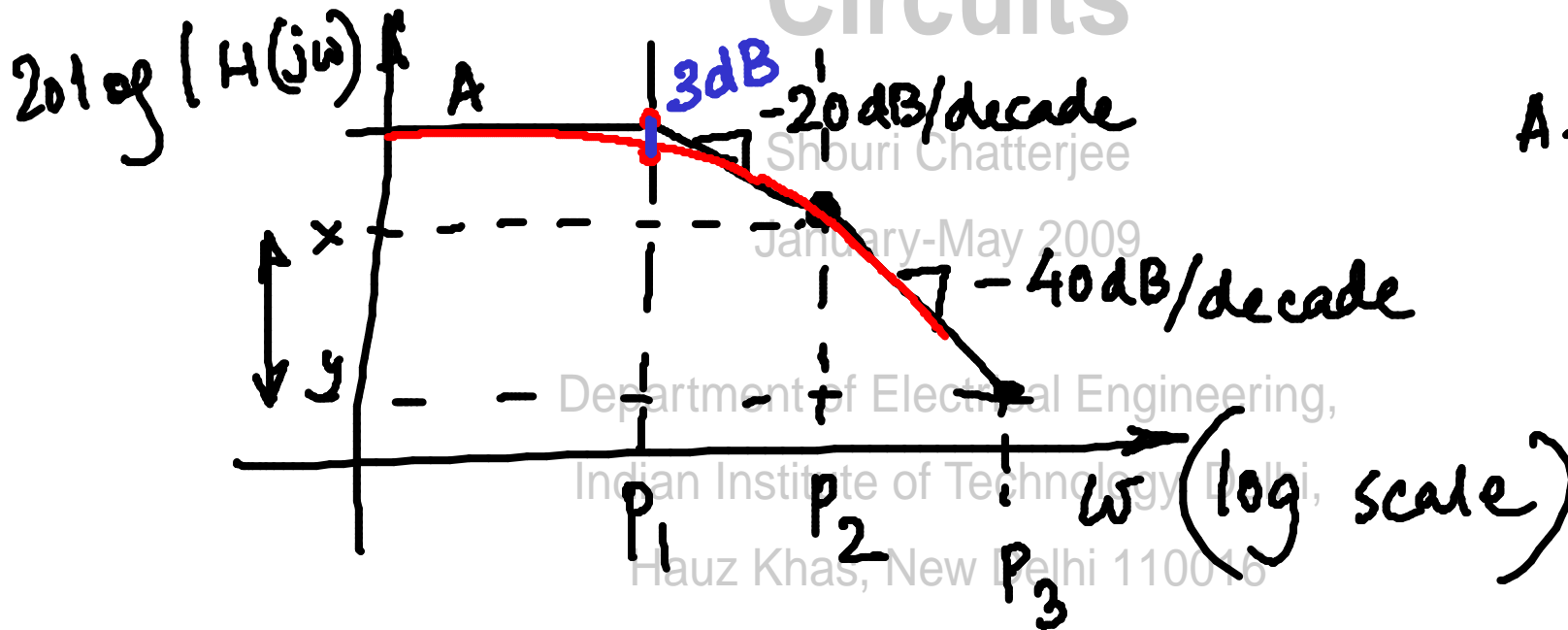


$$P_1 \ll P_2 \ll z_1 \ll z_2$$

$$-20 \log \left| 1 + \frac{j\omega}{P_1} \right| - 20 \log \left| 1 + \frac{j\omega}{P_2} \right| + \dots$$



$$A \cdot P_1 = x \cdot P_2$$



pole \longrightarrow slope decreases by
20 dB/decade

phase decreases
by 90°

Zero \longrightarrow slope increases by
20 dB/decade

RHP zero
 ϕ decreases by 90°

LHP zero
 ϕ increases by 90°
 45°

Rounding off

3dB

$$20 \log \left| \frac{1}{1+j} \right|$$

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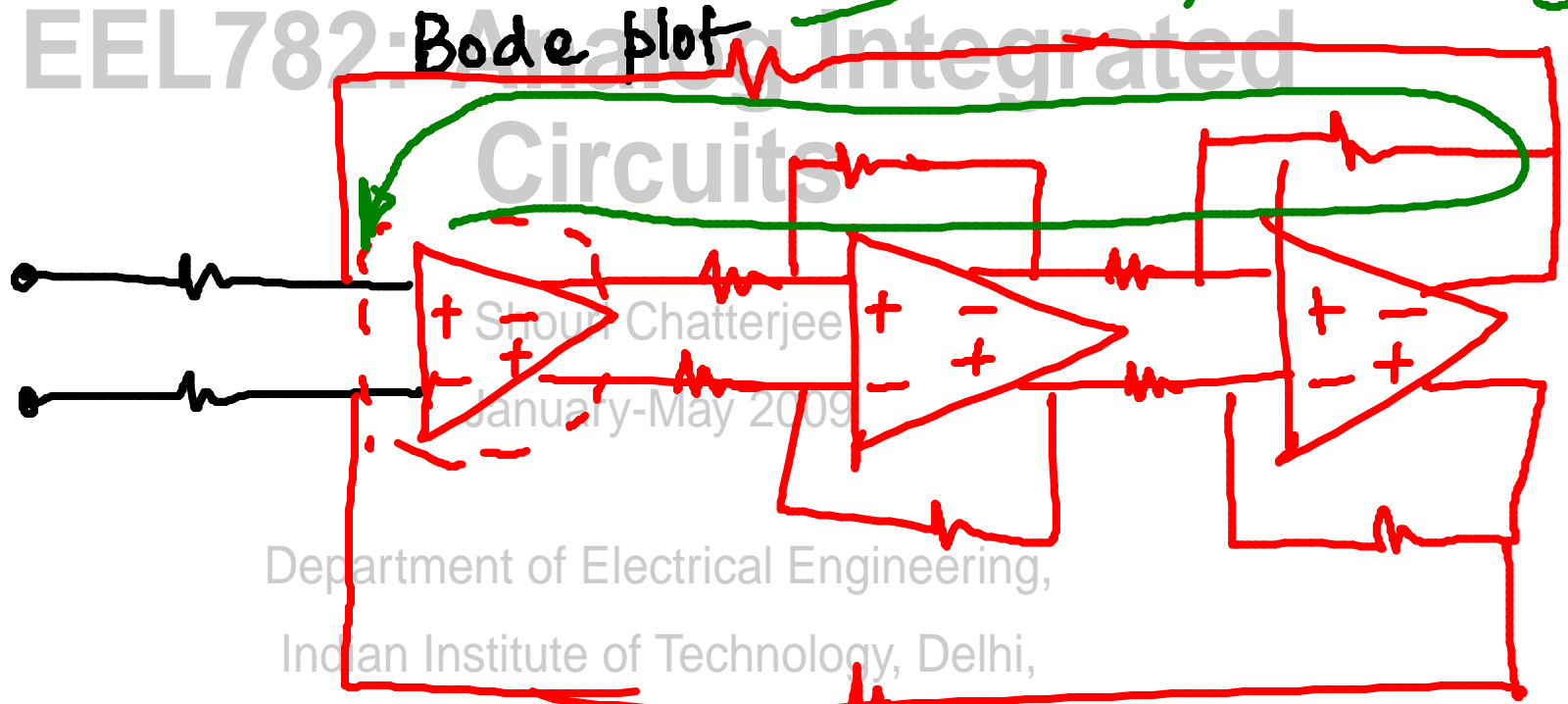
Why?

Routh - Hurwitz

Nyquist

Bode plot

Gain/phase margin



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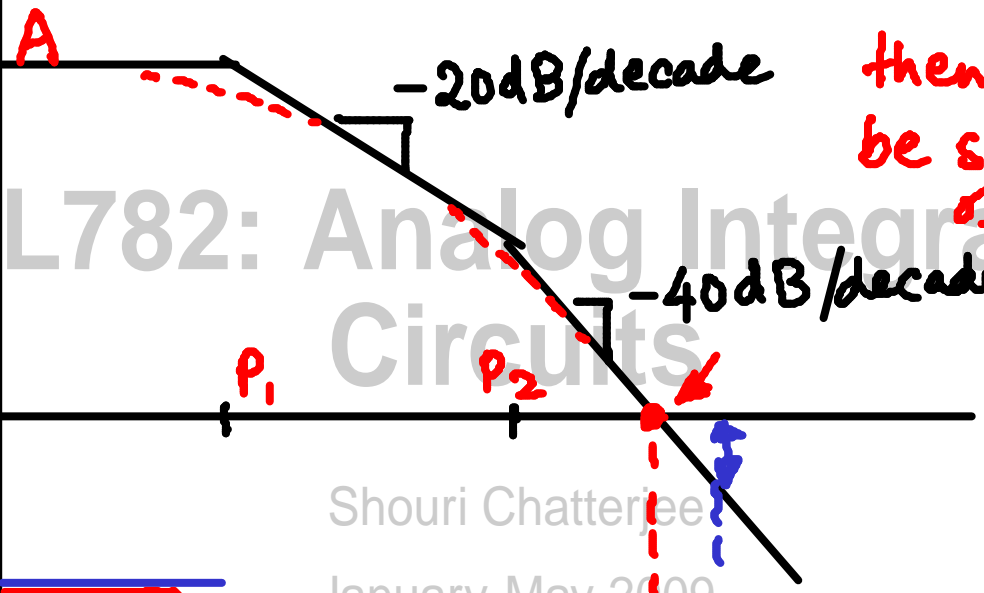


(dB)
 $|H(j\omega)|$

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0 dB

$\angle H(j\omega)$



-20dB/decade

-40dB/decade

P_1

P_2

ω (log)

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P_1

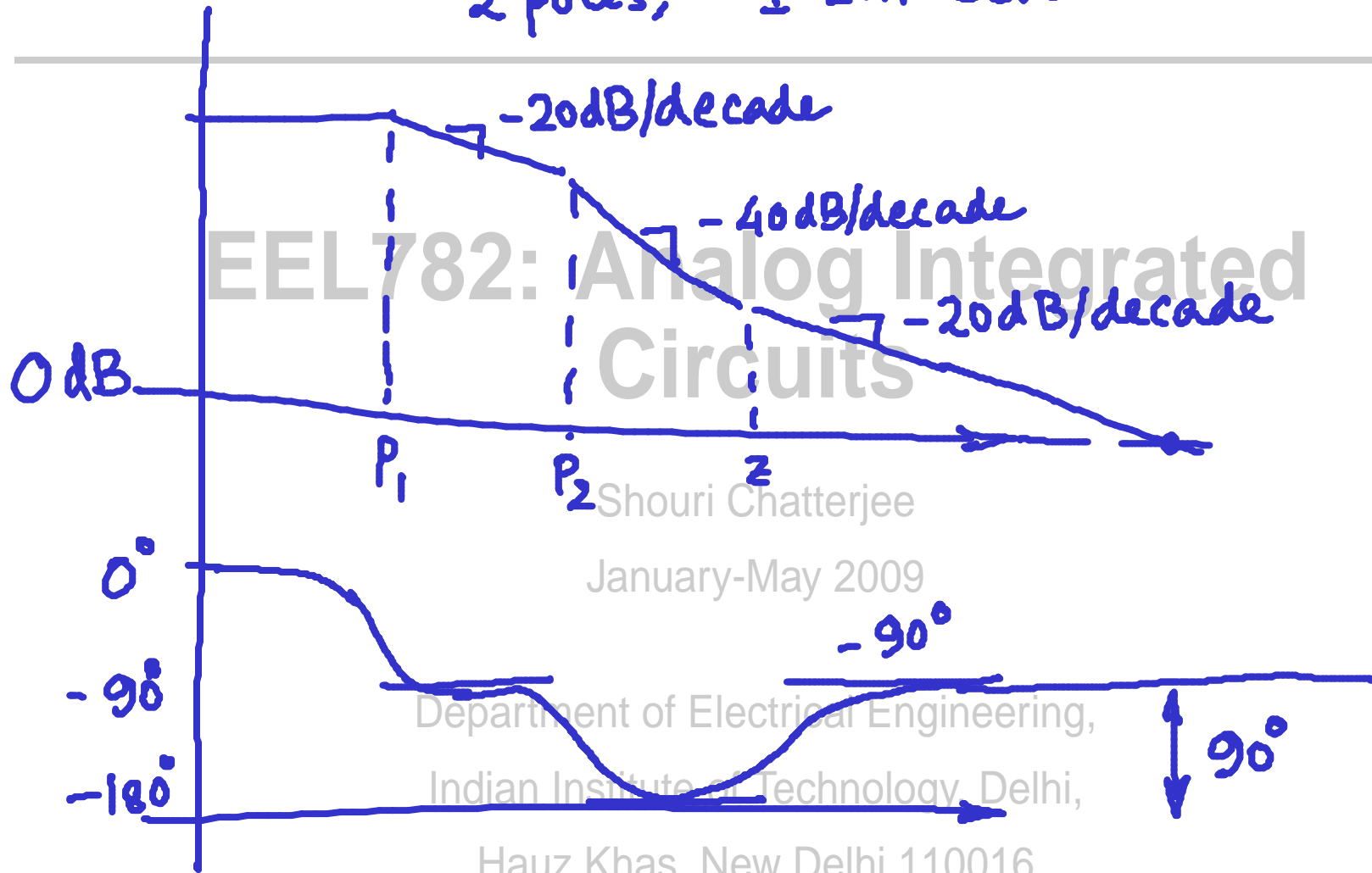
P_2

ω (log)

If ϕ margin > 0
then the system will
be stable in the presence
of unity gain -ive
feedback.



2 poles, 1 LHP zero

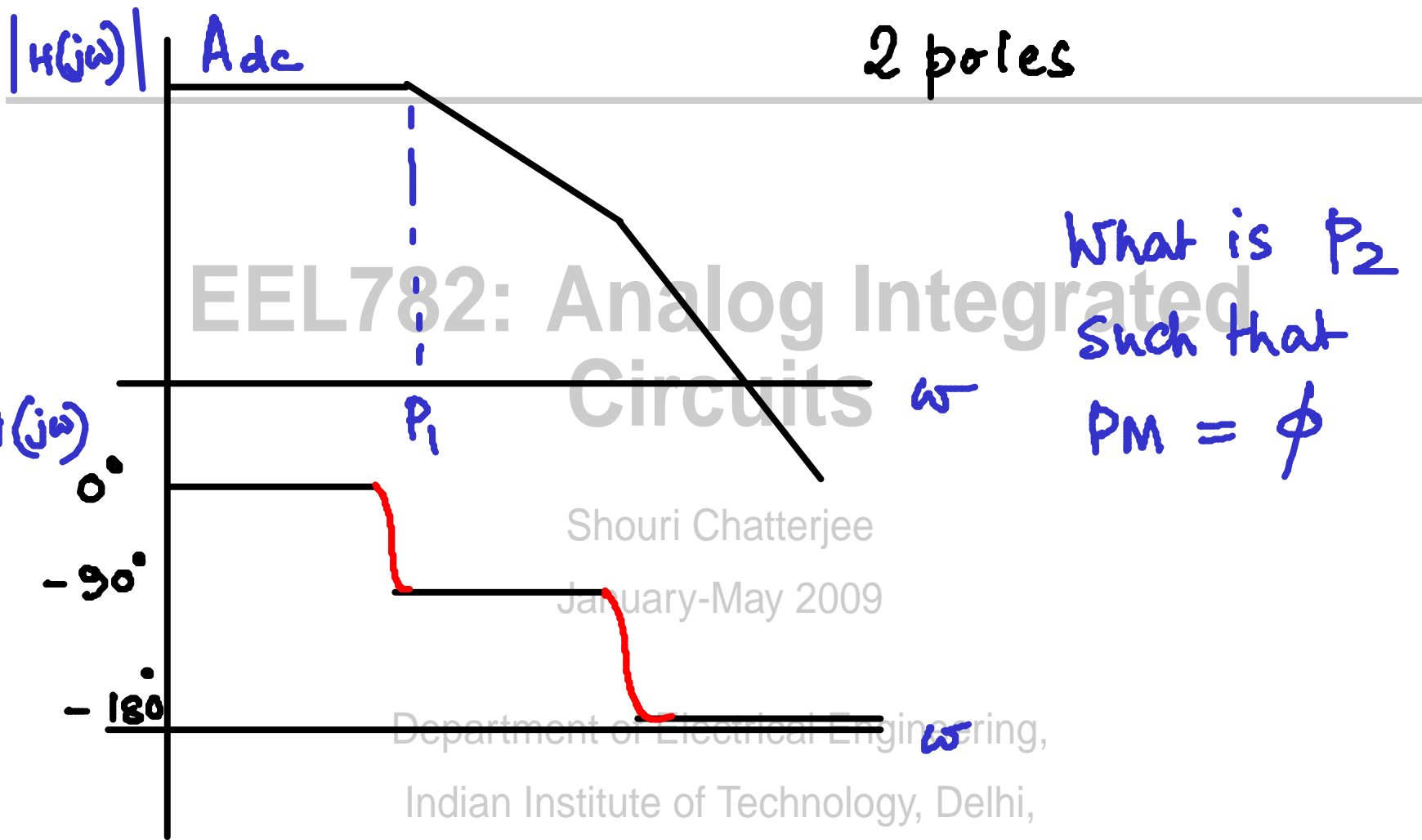


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