$$G(s)H(s) = \frac{80}{s(s+2)(s+20)}$$

ω	MdB	slope.
0.1	26.02	$\}$ −20dB/decade
2	0	$\}$ $\}$
20	−40	$\}$ −40dB/decade
100	−81.93	$\}$ −60 dB/dec.

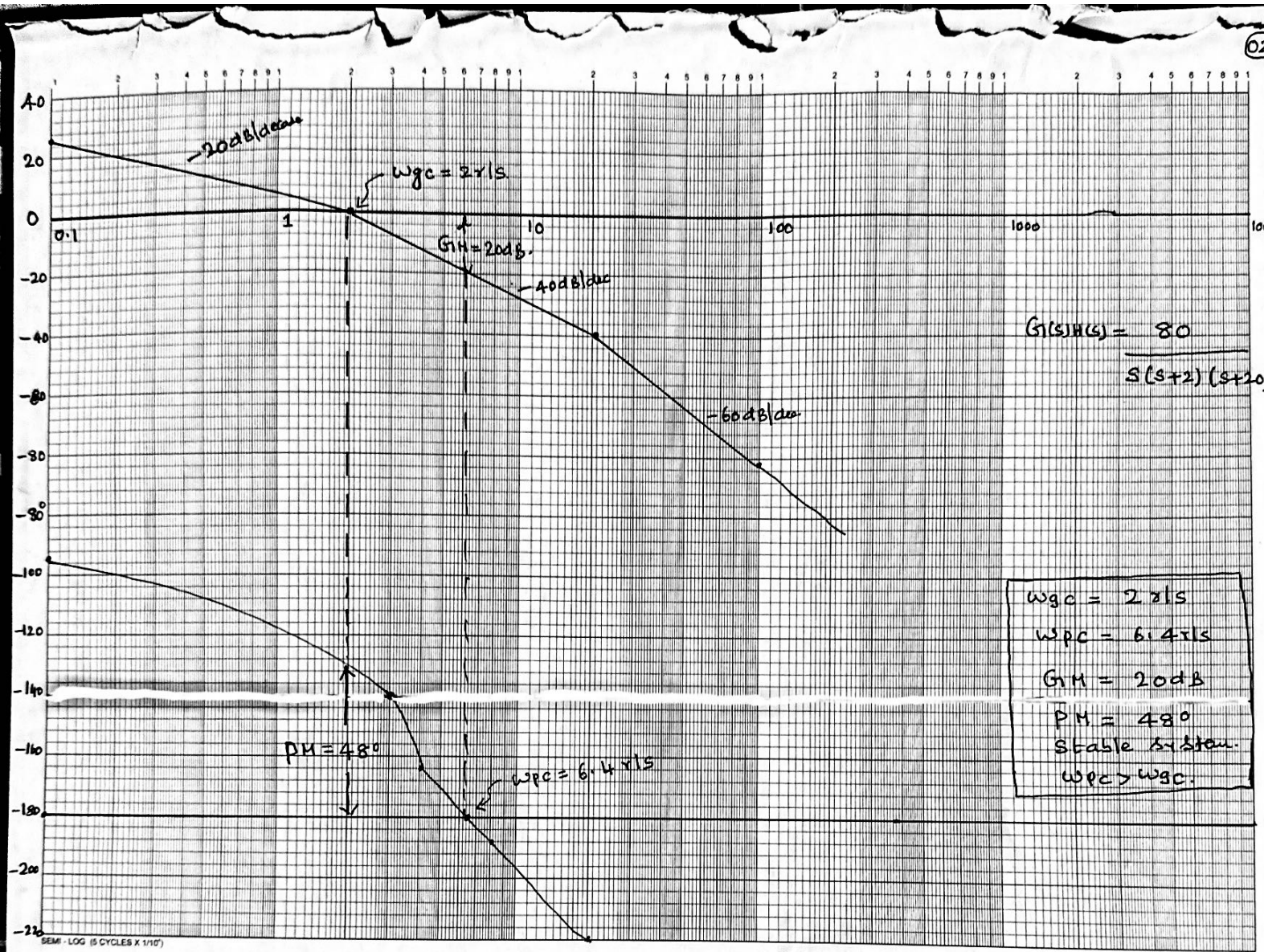
ω	θ	
0.1	−93.148	
2	−140.710	$\}$ Interpdation required
20	−219.289	$\}$
100	−257.544	

$\omega = 4$ −164.74

$\omega = 8$ −187.76

$\omega = 12$ −201.76

Try with $\omega = 6$.



$$G(s)H(s) = \frac{80}{s(s+2)(s+20)}$$

$\omega_{gc} = 2$ rad/s

$\omega_{pc} = 6.4$ rad/s

GM = 20dB

PM = 48°

Stable system.

$\omega_{pc} > \omega_{gc}$.

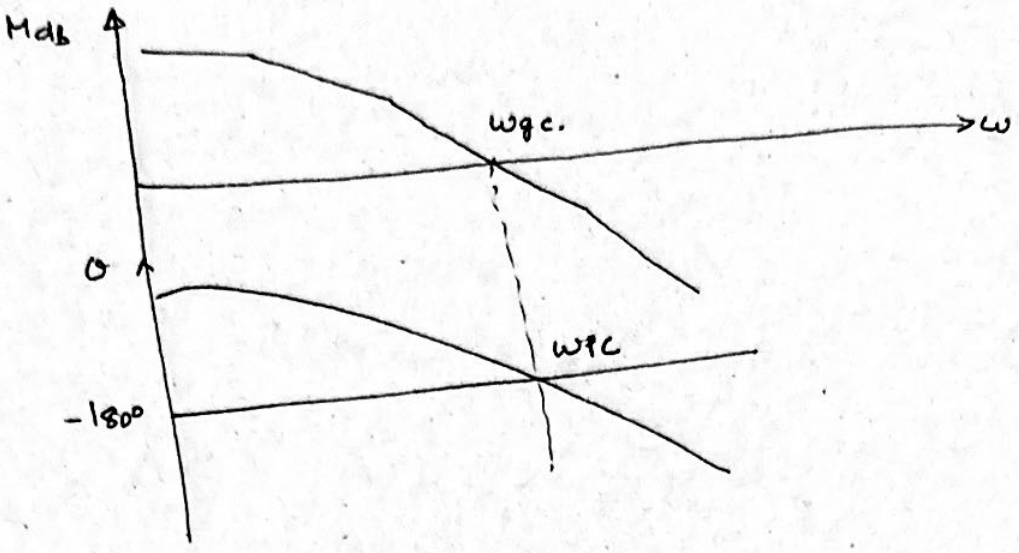
$$G(s)H(s) = \frac{27(s+2)}{s(s+6)(s^2+4s+s)}$$

ω	MdB	
0.1	2	$\}$ −20 dB/dec
2	−6.02	$\}$ 0 dB/dec.
3	−6.02	$\}$ −40 dB/dec.
6	−18.061	$\}$ −60 dB/dec
10	−31.371	
or 100	−91.372	

ω	θ		
0.1	−90.625		
2	−121.364		
3	−150.251	Interpolation required here.	$\omega = 4$ $\theta =$
6	−285		$\omega = 5$ $\theta =$
10	−294.01		
100	−269.098		

Follow same procedure given for previous problem.

Other Cases

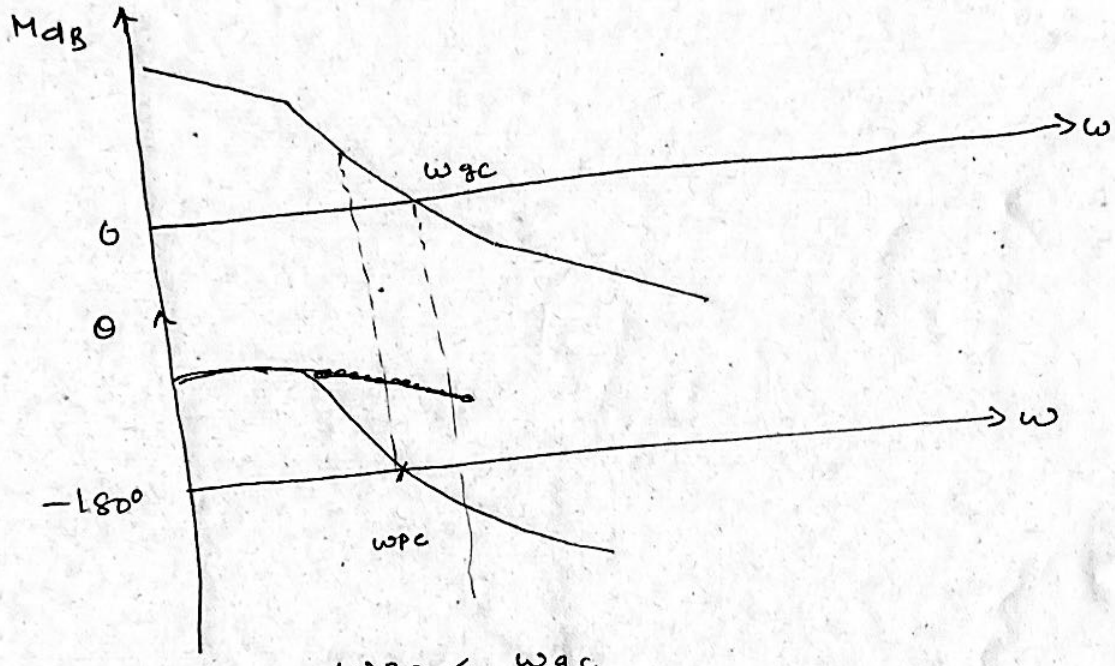


$\omega_{pc} = \omega_{gc}$.

At this frequency

$MdB = 0$ and $\angle G(j\omega)H(j\omega) = -180°$

$\Rightarrow$ Critically stable.



$\omega_{pc} < \omega_{gc}$

No scope to ↑ gain

No scope to add phase lag.

$\Rightarrow$ Unstable system.

Self study: Resonant peak.
Definitions of GM, PM, ω_{gc}, ω_{pc}.