CONTROLAUTOMATICO

Tema: Tiempos de Estabilización y Sobre Impulso

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1) **ENCONTRAR ωn y ζ**

ζ=Cos(30)=√3/2

PUNTO A

3=ωnζ

6=1/2ωn

(6*2)/1=ωn

ωn=12

ζ=Cos(60)=1/2

PUNTO B

6=ωnζ

6=√3/2ωn

(6*2)/√3=ωn

ωn=4√3

PUNTO C

3=ωnζ

3=1/2ωn

(3)/(1/2)=ωn

ωn=6

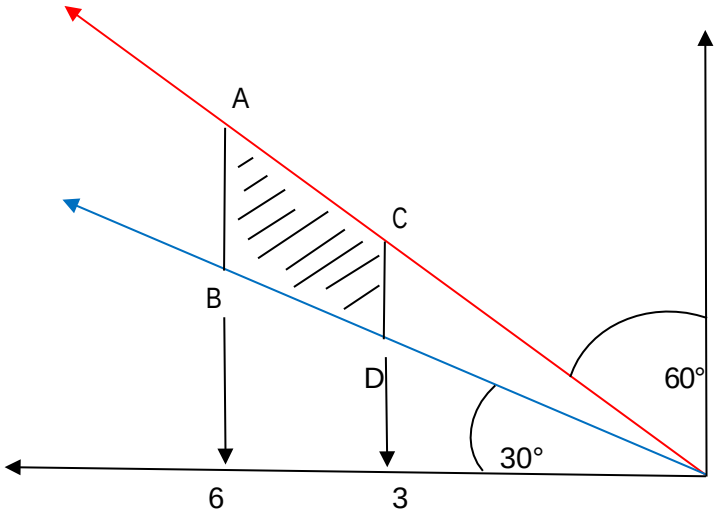
PUNTO D

3=ωnζ

3=(√3)/2ωn

(3*2)/√3=ωn

ωn=2√3



2)

SOBREIMPULSO

$M=e^{-(\zeta\pi/\sqrt{1-\zeta^2})}$

$M_1=e^{-((1/2)\pi/\sqrt{1-(1/2)^2})}$

$M_1=0.163$

$M_2=e^{-((\sqrt{3}/2)\pi/\sqrt{1-(\sqrt{3}/2)^2})}$

$M_2=0.004$

TIEMPOS DE ESTABILIZACION

$T_{s2}=4/\omega n\zeta$

PUNTO A

$T_{s2}=4/(1/2)*12$

$T_{s2}=0.66\,\%$

PUNTO B

$T_{s2}=4/(1/2)*12$

$T_{s2}=0.66\,\%$

PUNTO C

$T_{s2}=4/(1/2)*6$

$T_{s2}=1.33\,\%$

PUNTO D

$T_{s2}=4/(\sqrt{3}/2)*2\sqrt{3}$

$T_{s2}=1.33\,\%$

3)

FUNCION DE TRANSFERENCIA

$$\frac{\omega n^2}{S^2+2\omega n\zeta S+\omega n^2}$$

PUNTO A

$$\frac{(12)^2}{S^2+2(1/2)12S+(12)^2}$$

$$\frac{144}{S^2+12S+144}$$

PUNTO B

$$\frac{(4\sqrt{3})^2}{S^2+2(\sqrt{3}/2)(4\sqrt{3})S+(4\sqrt{3})^2}$$

$$\frac{48}{S^2+12S+48}$$

PUNTO C

$$\frac{(6)^2}{S^2+2(1/2)6S+(6)^2}$$

$$\frac{36}{S^2+6S+36}$$

PUNTO A

$$\frac{(12)^2}{S^2+2(1/2)12S+(12)^2}$$

$$\frac{12}{S^2+6S+12}$$

PUNTO A

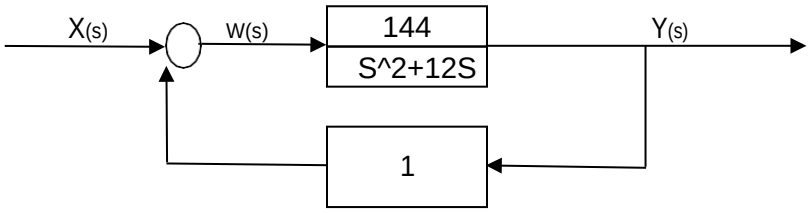
$$\frac{Q_s}{P_s+Q_s} = \frac{144}{S^2+12S+144}$$

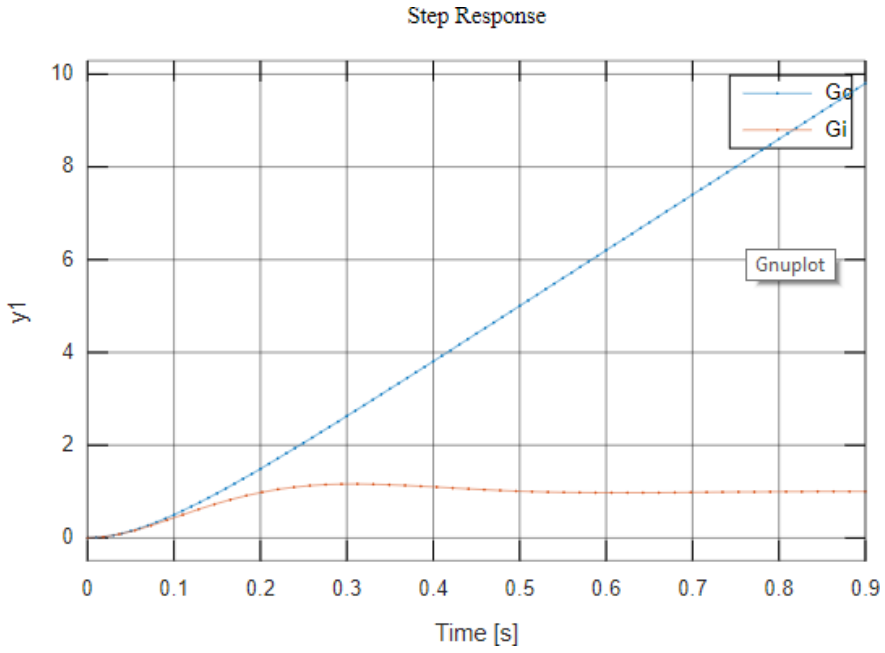
$$\frac{144}{P_s} = \frac{144}{S^2+12S}$$

$$P_s = \frac{S^2+12S}{144}*144$$

$$P_s = \frac{144}{S^2+12S}$$

$$\frac{Q_s}{P_s} = \frac{144}{S^2+12S}$$





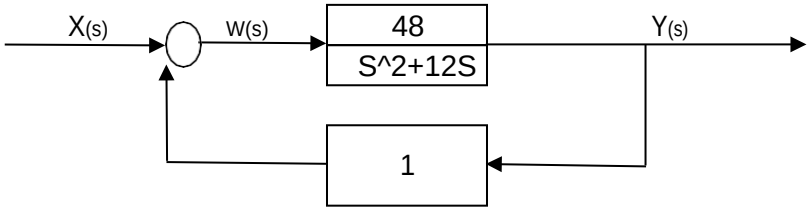
PUNTO B

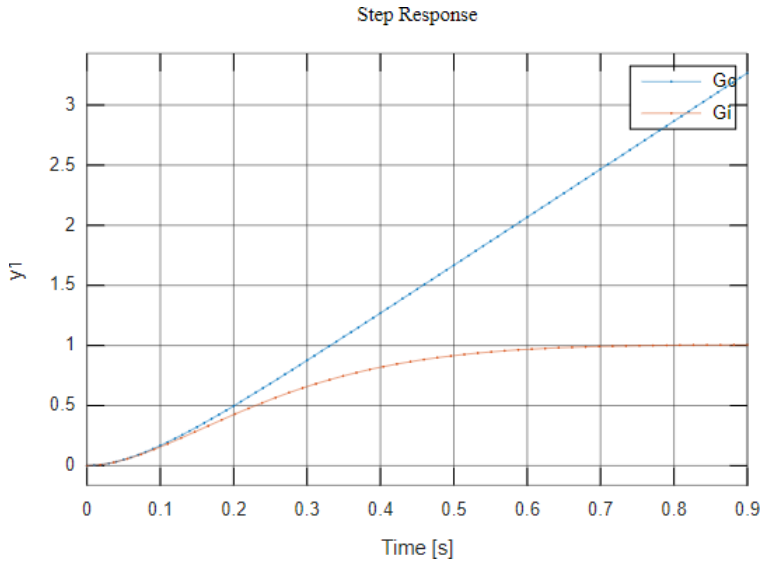
$$\frac{Q_s}{P_s+Q_s} = \frac{48}{S^2+12S+48}$$

$$\frac{48}{P_s} = \frac{48}{S^2+12S}$$

$$P_s = \frac{S^2+12S}{48} * 48$$

$$P_s = S^2+12S \qquad Q_s = \frac{48}{S^2+12S}$$


X(s)
W(s)
48
S^2+12S
Y(s)
1


Step Response
Go
Gf
y1
Time [s]
0
0.5
1
1.5
2
2.5
3
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

PUNTO C

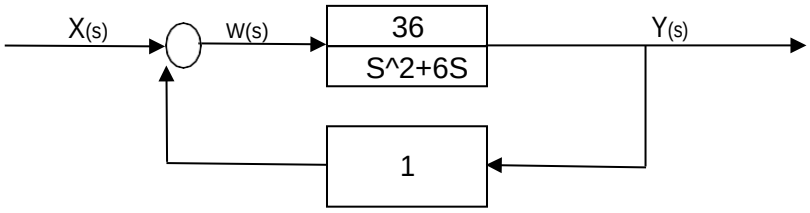
$$\frac{Q_s}{P_s+Q_s} = \frac{36}{S^2+6S+36}$$

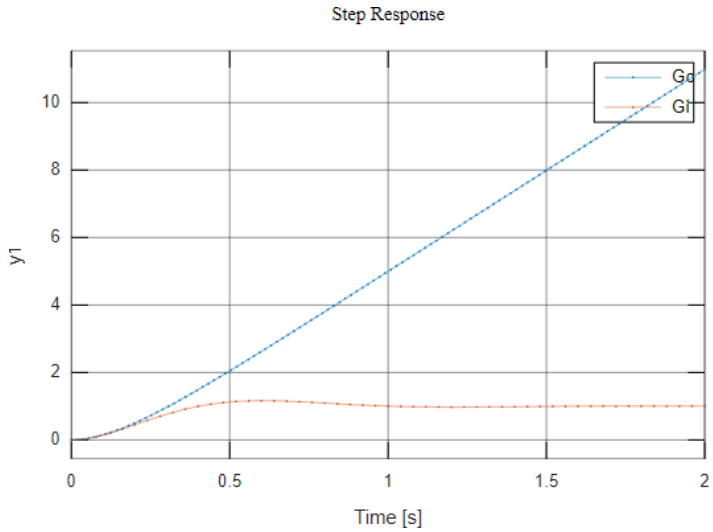
$$\frac{36}{P_s} = \frac{36}{S^2+6S}$$

$$P_s = \frac{S^2+6S}{36} * 36$$

$$P_s = S^2+6S$$

$$\frac{Q_s}{P_s} = \frac{36}{S^2+6S}$$





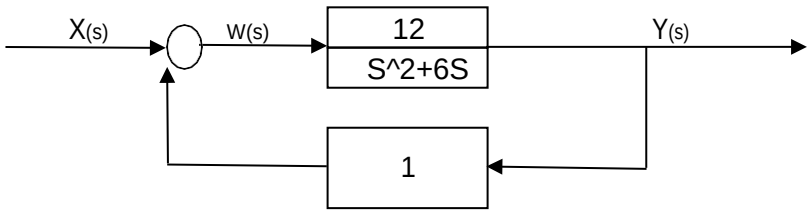
PUNTO C

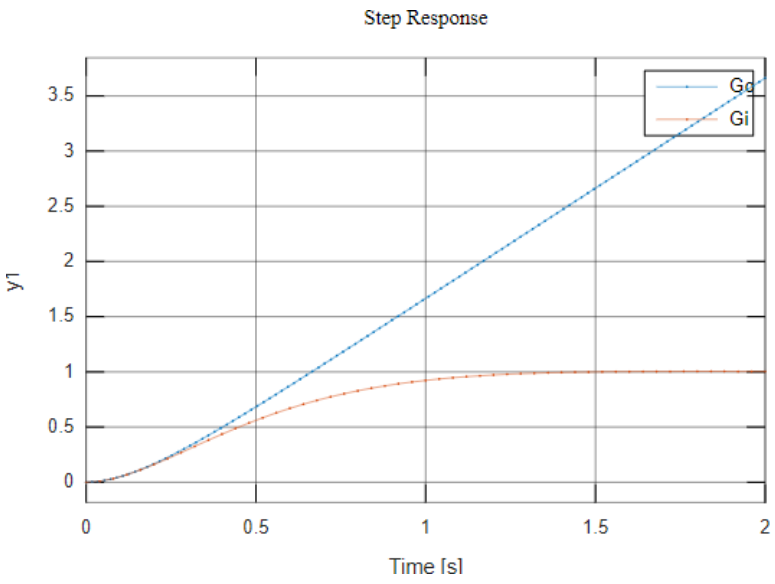
$$\frac{Q_s}{P_s+Q_s} = \frac{12}{S^2+6S+12}$$

$$\frac{12}{P_s} = \frac{12}{S^2+6S}$$

$$P_s = \frac{S^2+6S}{12}$$

$$P_s = S^2+6S \qquad \frac{Q_s}{P_s} = \frac{12}{S^2+6S}$$




Step Response
Gc
Gi
y1
Time [s]
0
0.5
1
1.5
2
3.5
3
2.5
2
1.5
1
0.5
0