Bode Plot -

Ex-2.) Draw the Bode Blot of the unity feedback system with forward gain as:

G(s)= 40/(s+2)(s+5)

Also determine the gain mangin, phase margin and comment on the stability of the system.

Solution:

() Convert transfer function to costant form

GCS)H(S) = 40/(S+2)(S+B) = 4/(I+0.55)(I+0.25)

2) Convert to sinusodial form-

GGW)HGW) = 4/(1+0.5jw)(1+0.2jw)

3) Different Bart of the Blot

(U Constant term K=4

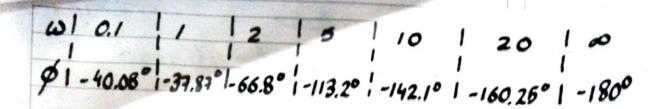
(ii) Type of system 0, this means initial slope is OdB/dec, and initial magnitude is 20log K = 20log 4 = 12.04dB (iii) Corner frequencies wu = 1/0.5 = 2rad /s,

W,= 5 radis

4) Draw reference slopes and axes.

5) Draw magnitude plot.

6) Draw Bhase Blot, \$= LGGGO)HGW=-tan-1(0.5w)-tan-1(0.2w)
Using this expression, tabulate some values of \$\psi w \cdot r \cdot t



Step 7) Grain cross-over and Bhase cross-over vand corresponding values of Bhase and magnitude

Wgc = 5.18 rad/s, & (wgc)=1150 Wpc = @rad/s, Mcwpc)=-00dB

Stop 8) Stability mangins

Grain Margins, GM=0.M(wpc)=0-6-00)=+00dB Phase Margins, PM=1800-\$(wgc)=1800-1150=650

The phase Blot curve is asymptotic to-180° axis at high v and the gain at high crossover is ive such that the GM is - w. Since, both PM and GIM tive, therefore, the system is stable. Further the GIM is infinite, Bence, the system inherently stable.

