



1-a- Define the following terms:

[25 marks]

i- Break away (in) Points

ii- Angle of asymptote.

iii- Departure angle

iv- Sustained Oscillation frequency

-b- For the unity feedback system $G = \frac{K(S+2)}{S^2 + 2S + 3}$, Construct the root locus.

then find:- i-Departure angle.

ii- The Break in point & the corresponding Gain.

iii- - The roots and Gain for $\zeta=0.7$

iv- The roots of the system at break in point.

2-a- Define the following terms:

[18 marks]

i- Gain cross-over frequency.

ii- phase cross-over frequency.

-b- A control system has a forward transfer function $G(s) = \frac{5.7}{(s+1)(s+3)}$ and a negative feed-back transfer function $H(s) = \frac{4}{s+2}$, find both the gain and phase margins of the system using bode diagram.

3-a- Define the following terms:

[20 marks]

i- Gain margin

ii- phase margin

-b- A control system has open-loop transfer function $G(s)H(s) = \frac{K(s+1)}{s(1+0.1s)(1+0.4s)}$ using logarithmic plots find: i) The value of K such that the Gain margin 22 db, then find ΦM

ii) The value of K, for a phase margin 45° then find GM

4- Fig (1) shows the log magnitude plot, determine the transfer function of the system and the system type [7 marks]

