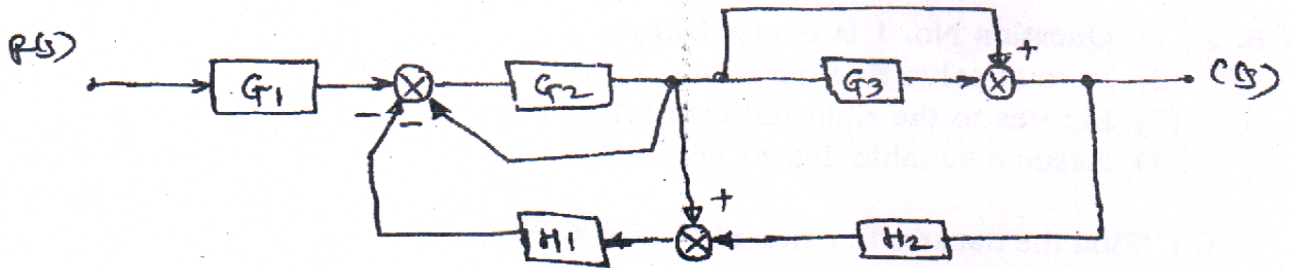5. (a) Find the closed loop transfer function of the system shown below 10

(b) Explain the difference between minimum and non-minimum phase transfer 10
functions.

6. (a) Sketch the Bode plot for transfer function 10

$$G(s)H(s) = \frac{20(S+1)}{S(S+5)(S^2+2S+10)}$$

and comment on stability.

(b) Sketch the root locus from the open loop transfer function given below and 10
determine stability.

$$G(s) = \frac{K(S+1)(S+2)}{(S+5)(S+6)}$$

7. (a) Using Routh - Hurwitz criteria find the stability of the characteristic equation. 10
$5s^6 + 3s^5 + 10s^4 + 9s^3 + 2ss^2 + 12s + 100 = 00$.

$$5s^6 + 3s^5 + 10s^4 + 9s^3 + 25s^2 + 12s + 100 = 0$$

(b) Write note on stepper motor. 10

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