

21-11-14

(3 Hours)



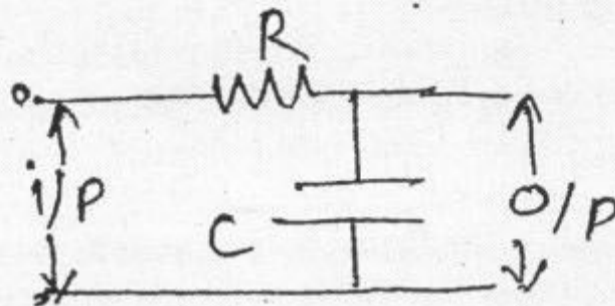
[ Total Marks : 80

- N.B. :**
- (1) Questions one compulsory.
  - (2) Solve any three.
  - (3) Assume suitable data.

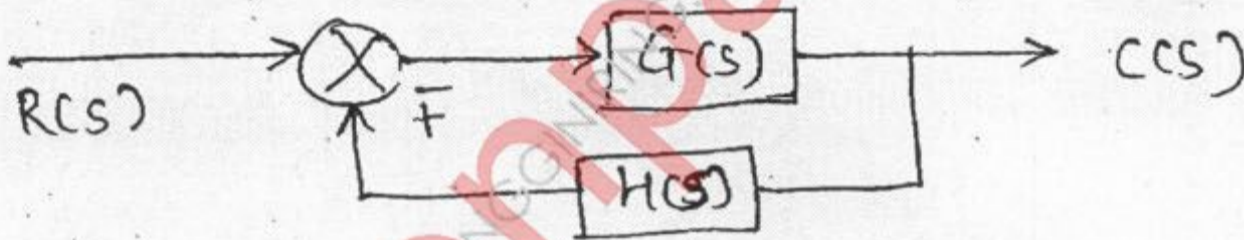
1. Solve any Four :

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- (a) Compare open loop and close loop system with examples.
- (b) Define break away point with suitable examples.
- (c) Find out transfer function of following circuit.

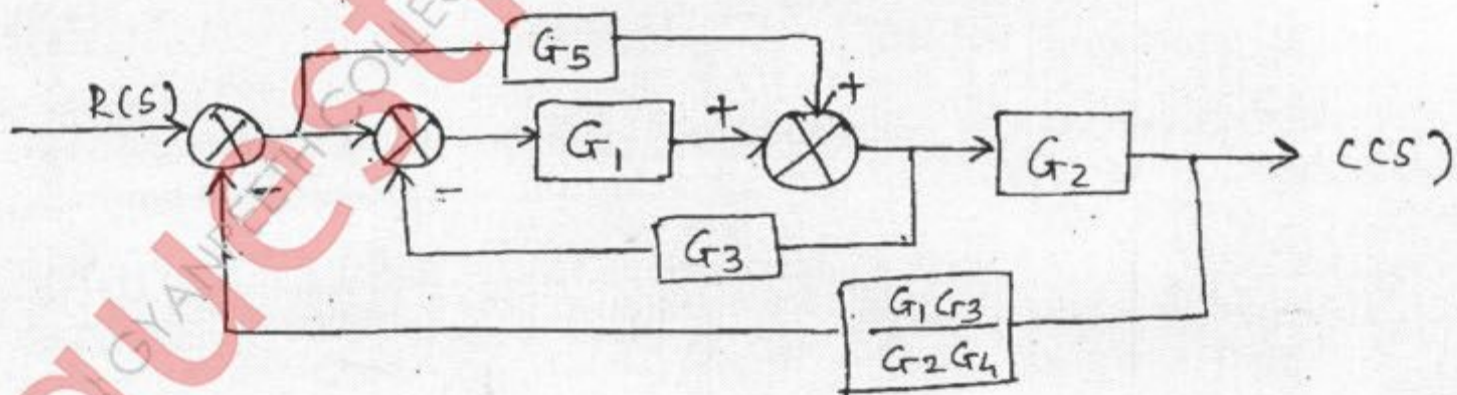


- (d) Comment on stability using bode plot.
- (e) Derive transfer function of a simple close loop system.



2. (a) Using block diagram reduction technique find close loop transfer function of system.

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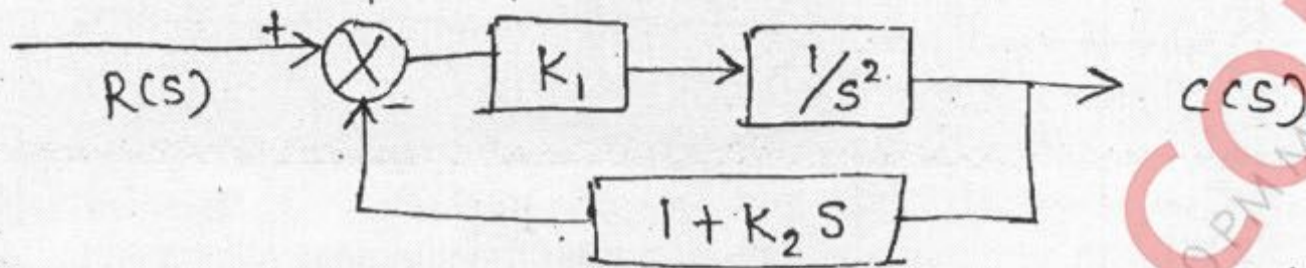


- (b) Draw Root locus plot for a system with

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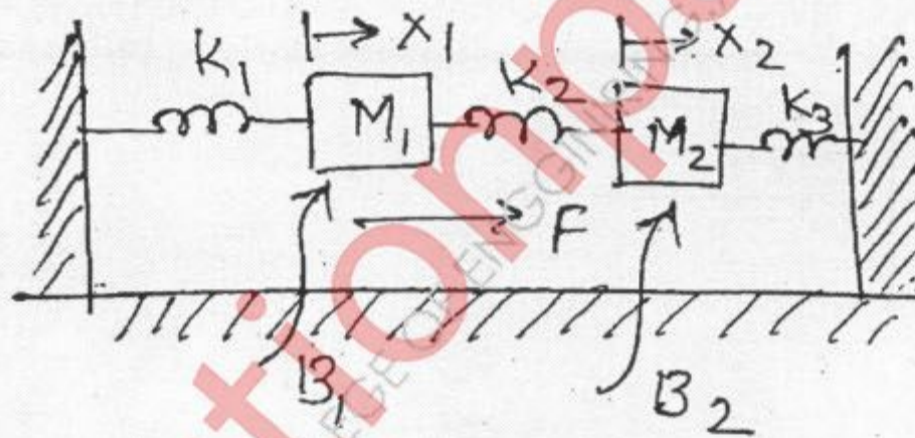
$$G(s)H(s) = \frac{K}{s(s+4)(s+8)}$$

3. (a) For a control system shown in figure find the value of  $K_1$  and  $K_2$  so that  $M_p = 25\%$  (Peak overshoot),  $T_p = 4$  sec. for unit step input. 10



- (b) Test the stability for following 10  
 (a)  $S^5 + 6S^4 + 15S^3 + 30S^2 + 44S + 24 = 0$   
 (b)  $S^6 + 2S^5 + 8S^4 + 12S^3 + 20S^2 + 16S + 16 = 0$

4. (a) Draw the equivalent mechanical system of the given system, Hence write the set of equilibrium equation for it and obtain electrical analog y. 10  
 1) F - V analog y  
 2) F - I analog y

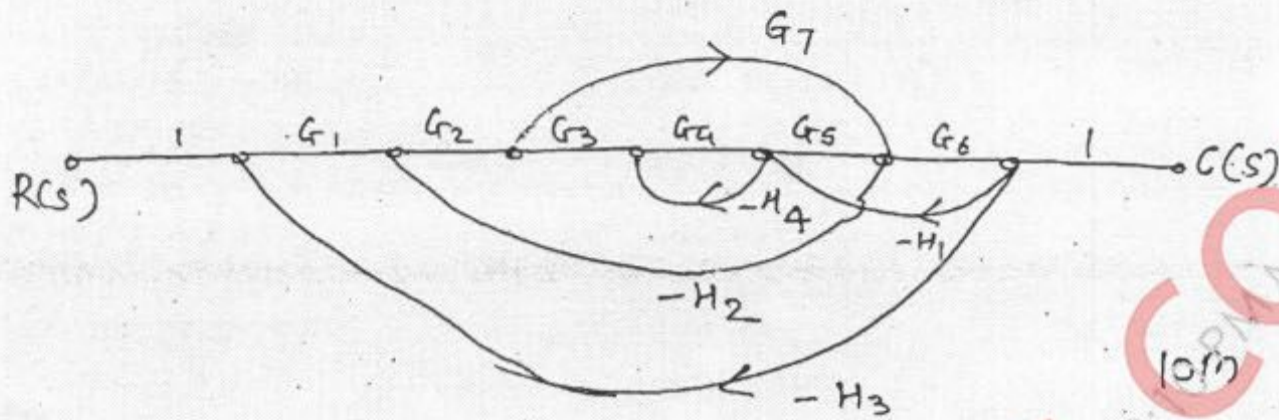


- (b) A system has T. F. with unity feed back where  $K = 2000$  using bode plot find out gain & phase margin, cross over for frequencies comment on stability. 10

$$G(s) = \frac{K(s + 0.3)}{(s + 4)(s^2 + 30s + 20)}$$

5. (a) Find the T. F. using mason's gain formula

10



- (b) State and explain Nyquist stability theorem and its criteria. 10
6. (a) Explain classification of system with respective various parameter. 10
- (b) Prove that polar plot of

$$G(S) = \frac{K}{S+a} \text{ is a circle. Find the centre}$$

and radius of circle hence draw polar plot of  $G(S) = \frac{40}{S+2}$

**GN-Con.:6856-14.**