

Code No: R22026

R10

SET - 1

II B. Tech II Semester Supplementary Examinations, April/May-2017

CONTROL SYSTEMS

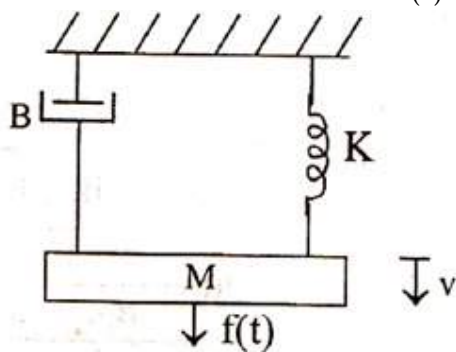
(Com. to EEE, ECE, EIE, ECC, AE)

Time: 3 hours

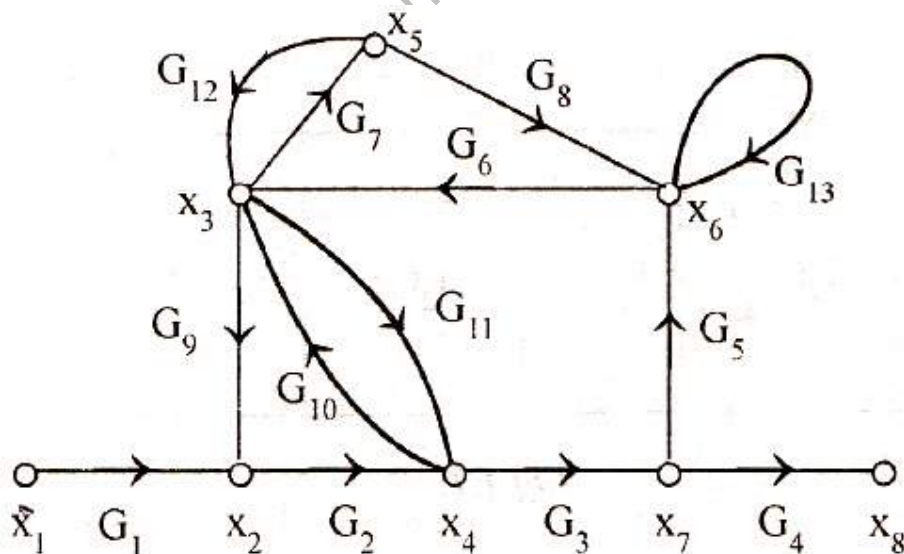
Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) What is control system? Write advantages and disadvantages of open loop and closed loop control system (8M)
- b) Determine the transfer function  $\frac{V(s)}{F(s)}$ , for the system show in below figure (7M)



2. a) Derive the transfer function of Synchronous transmitter (6M)
- b) Find the transfer function for control function shown below figure using Mason's gain formula (9M)



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**SET - 2**

3. a) The closed loop transfer function of unity feedback control system is given by  $\frac{C(s)}{R(s)} = \frac{5}{s^2 + 4s + 5}$ . Find Damping ratio, natural undamped response frequency, percentage peak overshoot. (8M)
- b) Determine the error co-efficient and static error for unity and non-unity system (7M)
- $$G(s) = \frac{1}{s(s+1)(s+10)}, H(s) = s + 2$$
4. a) A unity feedback system has the following open-loop transfer function (6M)
- $$G(s) = \frac{K}{(s+2)(s+4)(s^2 + 6s + 25)}$$
- Discuss the stability of the closed-loop system in term of parameter K. Determine the value of K which will cause sustained oscillations in the closed loop system
- b) Plot the root locus pattern of a system whose forward path transfer function is (9M)
- $$G(s) = \frac{K(s+1)}{s^2(s+2)}$$
5. a) The closed loop transfer function of feedback system is given by (7M)
- $$T(s) = \frac{1000}{(s+22.5)(s^2 + 2.45s + 44.4)}$$
- Determine the resonant peak  $M_r$ , and resonant frequency of the system
- b) Draw the bode plot of unity feedback system having (8M)
- $$G(s) = \frac{10}{s(1+0.01s)(1+0.1s)}$$
- Determine phase margin and gain margin
6. a) Sketch the polar plot for  $G(s) = \frac{1}{(1+sT_1)(1+sT_2)}$ . (5M)
- b) Construct the Nyquist plot for a system whose open loop transfer function is (10M)
- given by  $G(s)H(s) = \frac{K(1+s)^2}{s^3}$ . Find the range of K for stability
7. a) Write the effect and limitation of phase-lag controller (5M)
- b) Explain the design of Lead-Lag controller (10M)
8. a) State and prove the properties of state transition matrix (8M)
- b) Transfer function of a system is given by (7M)
- $$\frac{Y(s)}{U(s)} = \frac{2}{s^3 + 6s^2 + 11s + 6}$$
- find controllability and observability