

TEE-602

81

Printed Pages :5

Paper Code & Roll No. to be filled in your Answer Book

Roll No.

B. Tech. (IV - Sem.)

Even Semester Examination - 2016

CONTROL SYSTEM

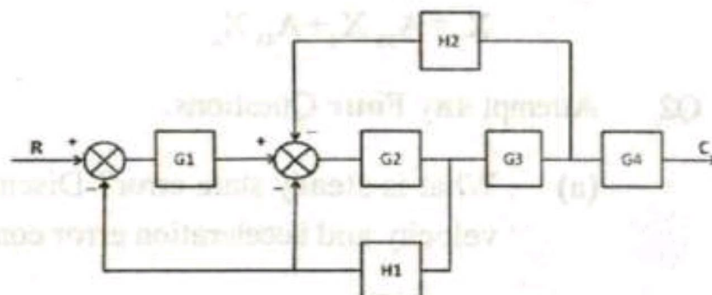
[Time : 3 Hours]

[Maximum Marks :100]

Note : Attempt all Questions.

Q1. Attempt any Four Questions. (5X4=20)

- (a) What are the different types of control system? Write down its advantages and disadvantages
- (b) What are different test signals? Write down the response of first order system with unit step.
- (c) Find transfer function using block diagram reduction method

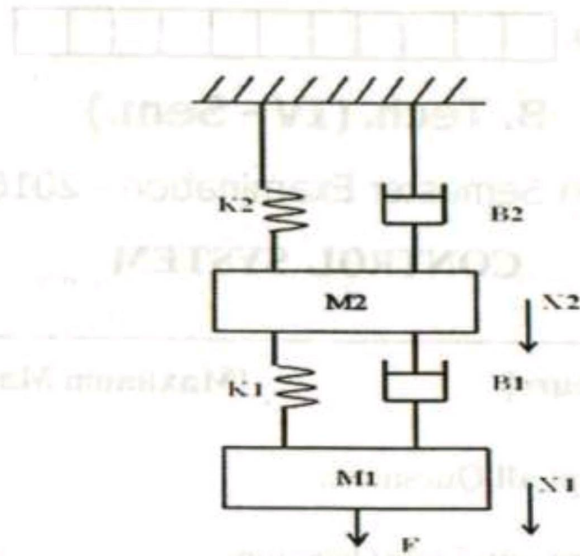


TEE-602/1340

(1)

[P.T.O.]

(d) Write down F-V and F-I analogy of following system



(e) for the system represented by following equations .find the transfer function X_5/X_1 .

$$X_1 = A_{12} X_2 + A_{32} X_3 + A_{42} X_4 + A_{52} X_5$$

$$X_3 = A_{23} X_2$$

$$X_4 = A_{34} X_3 + A_{44} X_4$$

$$X_5 = A_{35} X_3 + A_{45} X_4$$

Q2. Attempt any Four Questions. (5X4=20)

(a) What is steady state error? Discuss position, velocity and acceleration error constants.

(b) Define & explain PI, PD, and PID Controller. write its advantages also

(c) The open loop transfer function of a unity feedback control system is given by

$$G_s = \frac{k}{s(sT + 2)}$$

By what factor the time constant T should be multiplied so that the damping ratio is increases from 0.8 to 0.4

(d) A feedback system is given by

$$G(S) = \frac{12}{S^2 + 4s + 16}, H(s) = Ks$$

The damping ratio is 0.8.find the value of overshoot and value of k.

(e) What do you understand by undamped, underdamped and critically damped .

(f) What is the effect of location of poles on stability?

Q3. Attempt any Two Questions. (10x2=20)

(a) Explain ac servomotor. Also gives its transferfunction using torque-speed characteristic.

- (b) Draw root locus of for the system whose open loop transfer function is

$$G(s)H(s) = \frac{k}{s(s+6)(s^2+4s+13)}$$

- (c) What are the necessary conditions of Routh Hurwitz Criterion and

Check the stability of system using Routh Hurwitz Criterion

(i) $s^6 + 3s^5 + 5s^4 + 9s^3 + 8s^2 + 6s + 4 = 0$

(ii) $s^5 + s^4 + 3s^3 + 3s^2 + 4s + 8 = 0$

Q4. Attempt any Two Questions. (10X2=20)

- (a) Write down the correlation between frequency domain and time domain.
- (b) Sketch the nyquist plot and determine stability for the given unity feedback control system

$$G(s)H(s) = \frac{2}{s(s+2)(s+10)}$$

- (c) Draw polar plot for $G(s)H(s) = \frac{20}{s(s+1)(s+2)}$

Q5. Attempt any Two Questions. (10x2=20)

- (a) Draw bode plot for

$$G(s)H(s) = \frac{400(s+2)}{s^2(s+5)(s+10)}$$

- (b) Explain phase lag network and write its design procedure.
- (c) Draw a phase lead network for a system having

$$G(s)H(s) = \frac{k}{j\omega(1+j\omega)(1+0.2j\omega)}$$

for specifications

(i) $K_v = 3 \text{ sec}^{-1}$

(ii) P.M $e^{-\pi} 45^\circ$

$$G(s)H(s) = \frac{k}{(1+T_1s)(1+T_2s)}$$

----- x -----