

B.Tech 6th Semester (EE) F-Scheme Examination,

May-2017

CONTROL SYSTEM ENGINEERING

Paper-EE-304-F

Time allowed : 3 hours]

[Maximum marks : 100

Note : Question No. 1 is compulsory. Attempt one question from each section.

1. (a) Explain the concept of causality in control system.
- (b) Show the force-voltage analogy in mathematical modeling in control system.
- (c) Explain the concept of maximum overshoot.
- (d) Explain D.C. techo-generator. 20

Section-A

2. Explain the effects of feedback on sensitivity with parameter variation. 20
3. Write short note on : 20
 - (a) Overall gain
 - (b) Time-varying system.
 - (c) External disturbance

Section-B

4. Obtain the mathematical modelling of the system shown in Fig.-1 below : 20

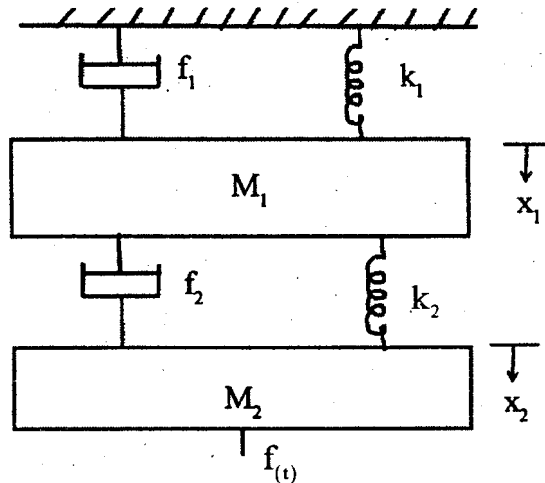
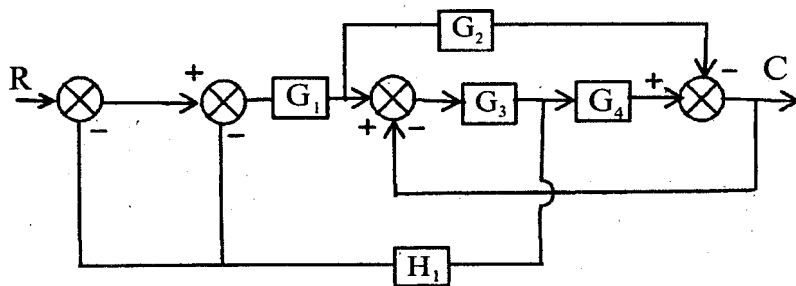


Fig.-1

5. Draw the signal flow graph and determine the overall transfer function. 20



Section-C

6. Sketch the root locus for the open loop transfer function of unity feedback control system given as :

$$G(S) = K/S(S+1)(S+3) \text{ and determine :}$$

- (a) The value of K for $\zeta_c = 0.5$
 (b) The value of K for marginally stable. 20
7. The maximum overshoot of a unity feedback control system having its forward path gain is $G(S) = K/S(S+1)$ is to be reduced from 60% to 20%, the system input is a unit step function. 20

Section-D

8. Using Nyquist criterion investigate the closed loop stability of the system whose open loop transfer function is $G(S)H(S) = K(S+1)/(S+0.5)(S-2)$

Consider :

- (a) $K = 1.25$ and
 (b) $K = 2.5$
- Also determine the limiting value of K for stability. 20
9. Draw the Bode-plot for the transfer function given as $G(S)H(S) = 48(S+10)/S(S+20)(S^2+2.4S+16)$. Apply correction to the magnitude plot for the quadratic term and comment on the stability. 20