Total No. of Questions : 8] *[Total No. of Printed Pages : 3*

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EX-602 (GS)

B.E. VI Semester

Examination, December 2017

Grading System (GS)

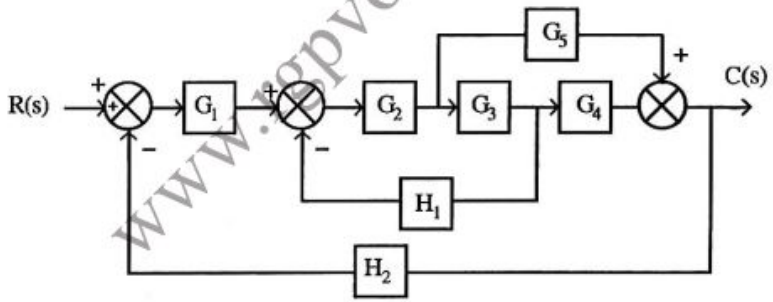
Control Systems

Time : Three Hours

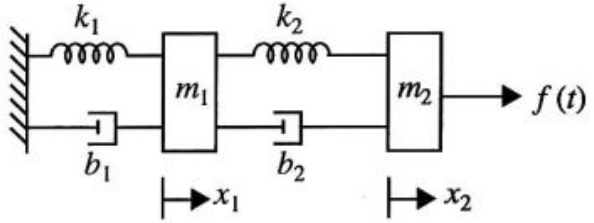
Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.

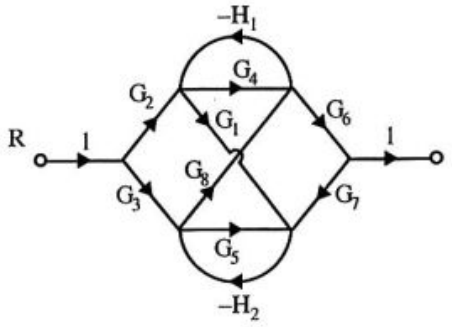
1. a) Reduce the block diagram for C(s)/R(s) using block diagram reduction technique. 7



b) Find the transfer function $X_2(s)/F(s)$ for the mechanical system shown in figure 2. 7



2. Find the over all gain using Mason's gain formula. 14



3. a) $G(s)=\dfrac{10(s+1)}{s^2(s+2)(s+10)}$ for a unity feedback system determine 7

i) Type of the system

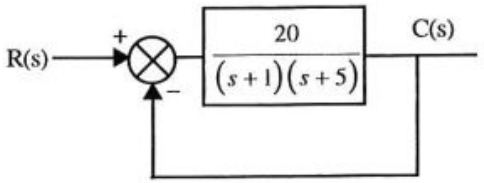
ii) Error constants

iii) Steady state error for $r(t) = 1 + 4t + t^2/2$

b) Determine the stability for 7

$s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$

4. The block diagram of a unity feedback control system in following figure



Determine the characteristics equation of the system, ω_n, ξ, ω_d, t_p, m_p, the time at which the first under shoot occurs, the time period of oscillations. 14

[3]

5. Draw the Bode plot for the following unity feedback system with open loop transfer function $G(s)=\frac{100}{s(1+0.1s)(1+0.2s)}$.
Comment on the stability and also calculate gain Margin and phase margin. 14

6. Draw the root locus for the following system 14

$$G(s)H(s)=\frac{k}{s(s+4)\left(s^2+4s+20\right)}$$

OR

For the following system plot root locus plot

$$G(s)H(s)=\frac{k}{(s+2)^3}$$

and find the range of k for stability.

7. Draw the Nyquist plot and comment on the stability of the system whose open loop transfer function is given as

$$G(s)H(s)=\frac{4(s-1)}{(s+2)}$$ 14

OR

Derive the transfer function, draw pole zero configuration and bode plot for a phase lead compensation network.

8 Write short notes (any two) 7×2

a) Compensator
b) Controllers
c) Synchros
d) Servomotor

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