6E 6055

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6E 6055

B.Tech. VI - Semester (Main&Back) Examination, April - 2019
Electronics & Communication Engg.
6EC5A Control Systems

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **Five questions**, selecting **One question from each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. Graph paper. *2. Logarithmic paper.*

Unit - I

1. a) Define the following terms : **(8)**
   i) System
   ii) Control System
   iii) Feed back
   iv) Servo mechanism

   b) Reduce the block diagram (shown in Figure(i)) to obtain $\frac{C(s)}{R(s)}$. **(8)**

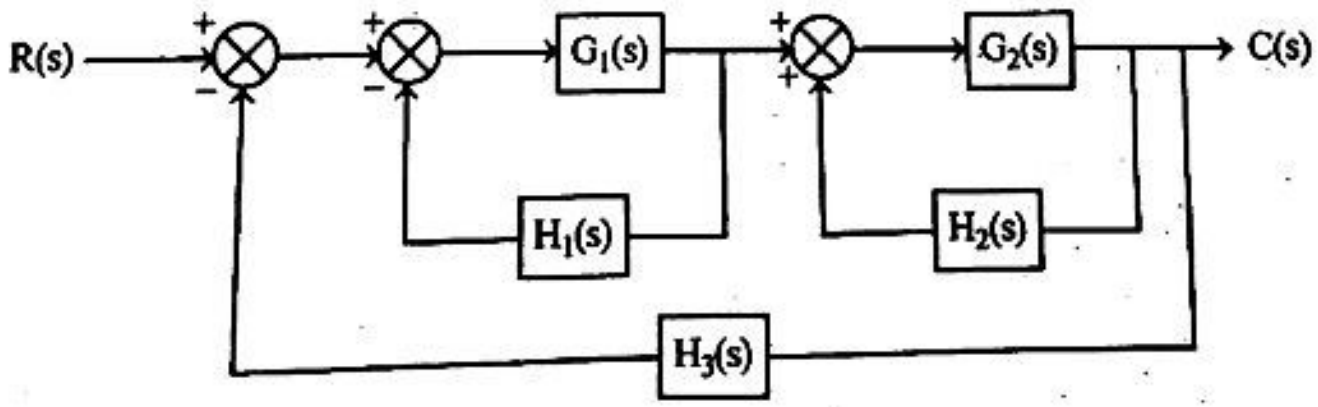


Figure - (i)

1. a) Find gain of the given system (shown in Figure (ii)) $\frac{C}{R}$ by using, Masson's gain formula. (8)

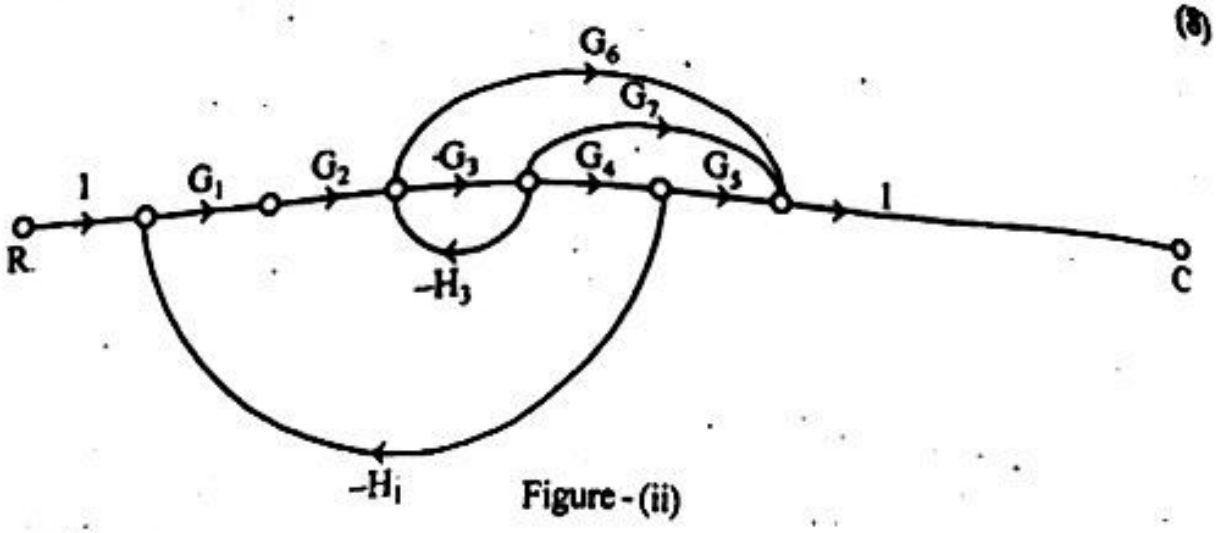
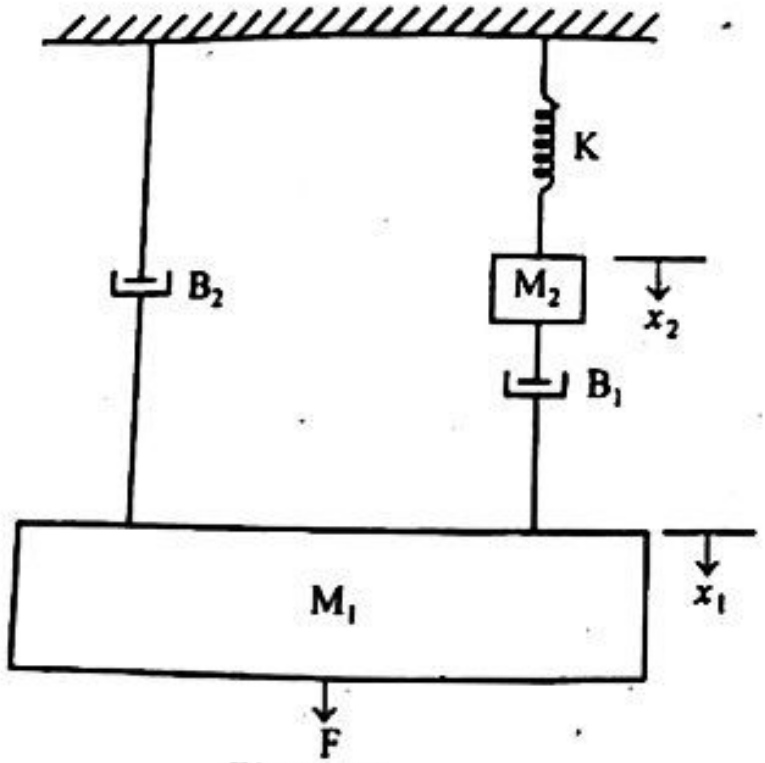


Figure - (ii)

b) For the system shown in Figure (iii), find the following: (8)

i) Force voltage Analogy

ii) Force current Analogy



(Figure - iii)

Unit - II

2. a) With the help of Routh-Hurwitz stability criterion comments upon the stability of the system having the following characteristic equation (8)

$$S^6 + S^5 + 8S^4 + 6S^3 + 20S^2 + 8S + 10 = 0$$

b) Derive the values of steady state error for type 0, 1 and 2 system due to following: (8)

i) Step input

ii) Ramp input

iii) Parabolic input

(OR)

2. a) Determine the unit step response of the second order system for the underdamped and critically damped cases. (10)

b) What do you understand by the term stability? Also explain the importance of stability. (6)

Unit - III

3. Obtain G(s)H(s) from the given equation and draw complete root locus for this control system $s(s+4)(s^2+4s+20)+k=0$. (16)

(OR)

3. Is the system with the following open-loop transfer function and with $K=2$ stable?

$$G(s)H(s)=\frac{K}{s(s+1)(2s+1)}$$

Find the critical value of the gain K for stability by use of the Nyquist stability criterion and also draw the complete Nyquist plot for this system. (16)

Unit - IV

4. Sketch the Bode plot and find the phase and gain margin for the system $G(s)H(s)=\frac{10(3+s)}{s(s+2)(s^2+s+2)}$ Also comment upon the stability of the system. (16)

(OR)

4. Write the short notes on the following:

i) M & N Loci

ii) Nichols chart (16)