Roll No .....

EE/EX-228

B.E. IV Semester

Examination, June 2017

Choice Based Credit System (CBCS)

Control System

Time : Three Hours

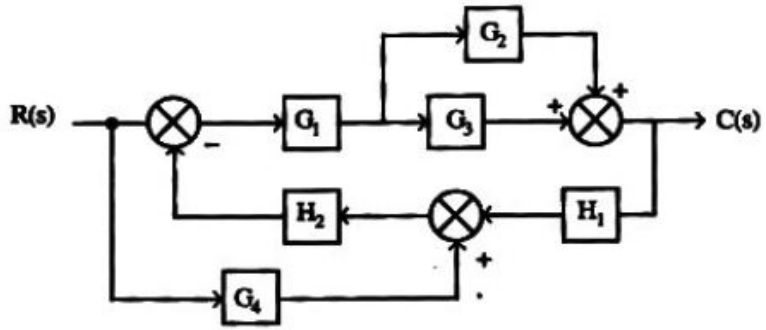
Maximum Marks : 60

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) Compare a.c. servo motors with d.c. servo motors.

   b) Determine the transfer function of the given system by block diagram reduction method.



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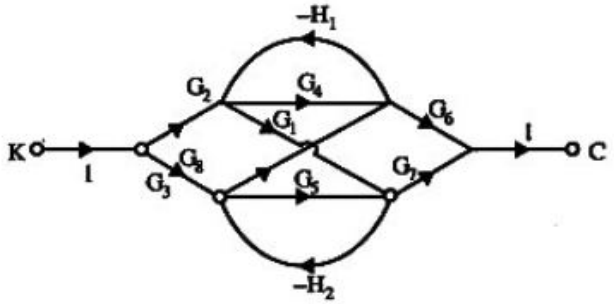
2. a) A control system is represented by the following signal flow graph. Find the overall gain using Mason's Gain formula.



   b) Find the force voltage analogy of the system?

3. a) Characteristics equation of a certain system is given by

$$F(s) = s^4 + 6s^3 + 18s^2 + (k-20)s + k = 0$$

   Find the range of gain k for the stability of the system.

   b) For a unity feedback system $G(s) = \dfrac{36}{s(s+0.72)}$.

   Determine the characteristic equation of the system. Hence calculate the damping ratio, peak time, settling time, peak over shoot and number of cycle completed before output is settled, when unit step is applied to the system.

4. a) Write the steps for constructing Root Locus.

   b) For a unity feedback system

$$G(s)=\frac{k}{s(s+4)(s+2)}$$

   Sketch the Root Locus and comment on the stability of the system.

5. For a unity feedback system

$$G(s)=\frac{800(s+2)}{s^2(s+10)(s+40)}$$

   Sketch the bode plot and comment on the stability

6. A unity feedback control system has

$$G(s)=\frac{10}{s(s+1)(s+2)}$$

   Draw Nyquist plot and comment on closed loop stability.

7. Design a log compensator for a system whose open loop transfer function is

$$G(s)H(s)=\frac{K}{s(s+4)(s+5)}$$

   To meet the following specifications Damping Ratio = 0.707

   $k_v \geq 5$ and $w_n = 2$ rad/sec.

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rite short notes on (any two):

) Controller

) Compensating networks

) Time response analysis of a second order system when input is unit step

l) Stability

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