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

Roll No .....

EE/EX-4004-CBGS

B.E. IV Semester

Examination, December 2020

Choice Based Grading System (CBGS)

Control Systems

Time : Three Hours

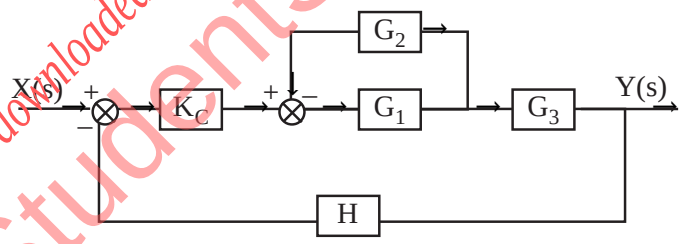
Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

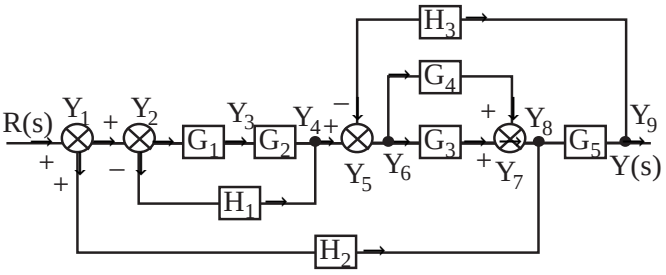
1. a) What is a control system? What are open and closed loop control systems? Enlist some applications in control systems?

   b) Determine the overall transfer function of the following closed loop control systems.



2. a) What is a mason gain formula? Explain each component of the formula and mention its advantages over block diagram reduction technique.

b) Draw the following block diagram into its equivalent signal flow graph.



3. a) Explain the procedure for plotting root locus.
   b) Discuss the following:
      i) Critical damping
      ii) Maximum overshoot
      iii) The settling time

4. a) A unity feedback control system has forward path transfer function given by $G(s) = \frac{s+2}{s(s+1)}$

   Determine expression for unit step response.
   b) Derive the expression for rise time and peak time.

5. a) What is meant by PD control? State the effect of PD controller on the system performance.
   b) Determine static error coefficients for a unity feed back system given by

$$G(s) = \frac{K}{S^2(S+20)(S+30)}$$

6. a) State the effects of adding poles of G(s)H(s) on the root locus.

   b) Sketch the root locus of the unity feed back system having

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

   Where K varies from 0 to infinity.

7. Discuss about the design of control systems with PD/ PI/ PID control in time domain and frequency domain.

8. Write short notes on :

   a) Routh-Hurwitz stability analysis

   b) AC-DC servomotors

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