B.Tech. SEM -IV E & TC 2014 Course (CBCS) : SUMMER - 2019
SUBJECT : CONTROL SYSTEM ENGINEERING

Day : Tuesday
Date : 28/05/2019

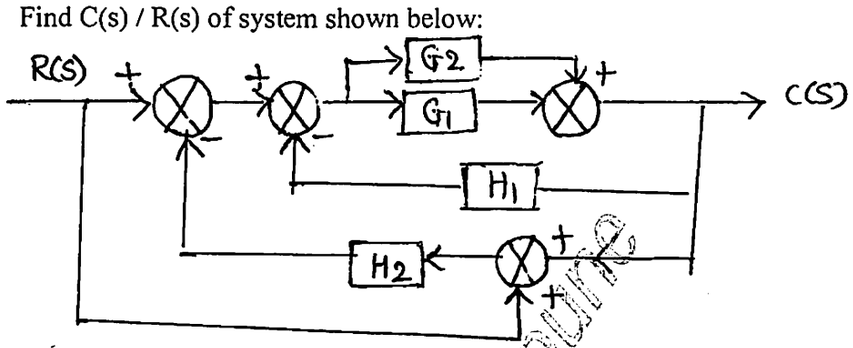
S-2019-2637

Time : 10.00 AM TO 01.00 PM
Max. Marks : 60

N. B. :

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labeled diagram **WHEREVER** necessary.
4) Assume suitable data, if necessary.

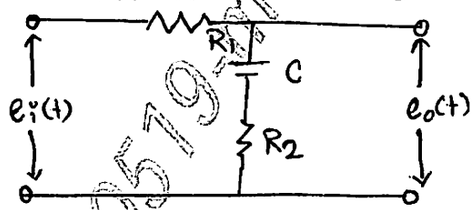
Q. 1 **a)** Find C(s) / R(s) of system shown below: **(06)**



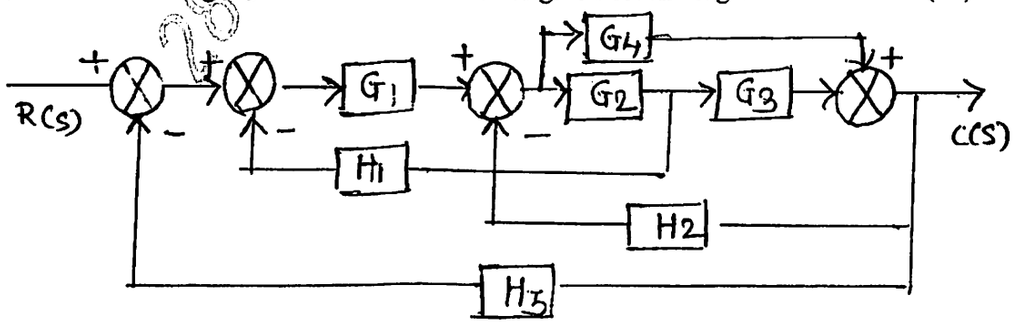
b) Derive the expression for T. F. of closed loop system. **(04)**

OR

a) Find T. F. of the $E_o(s)/E_i(s)$ of the following network: **(05)**



b) What is Mason's gain formula? Draw SFG for given block diagram. **(05)**



Q. 2 **a)** What is Thermistor? Explain working principle of Thermistor. **(05)**

b) What is the role of flow meters and level measuring instruments in industry? **(05)**

OR

a) What is strain gauge? **(05)**

b) Explain the construction of LVDT. **(05)**

P. T. O.

Q. 3 **a)** What is mean by following terms: **(05)**

i) Transient Response

ii) Steady state Response

iii) Maximum overshoot

iv) Rise time

v) Peak time

b) A unity F/B system is characterized by an open loop T.F. **(05)**
$G(s) = \dfrac{k}{s(s+10)}$.

Determine gain k so that the system will have damping ratio of 0.5 for this value of k, determine setting time, peak over shoot for unit step i/p.

OR

a) Obtain unit step response of unity F/B system whose open loop T.F. **(05)**
$G(s) = \dfrac{2s+1}{s^2}$

b) For a closed loop system with $G(s) = \dfrac{1}{s+5}$ and $H(s) = 5$ **(05)**

Calculate general error coefficients.

Q. 4 **a)** Sketch Pole – zero plot for following T.F. $G(s) = \dfrac{(s+1)(s+2)}{s^2(s^2+5s+6)}$. **(07)**

b) Using Routh-Hurwitz criterion, determine stability of closed loop system of having characteristic equation as: **(03)**
$s^6 + 2s^5 + 8s^4 + 16s^3 + 20s^2\ 15s + 16 = 0$.

OR

a) For given characteristic equation of F/B system determine range of k for stability and $s^4 + 25^3 + 15s^2 + 20s + K = 0$. **(04)**

b) Sketch root locus for a system with open loop T.F. **(06)**
$G(s)\ H(s) = \dfrac{K(s+2)}{s^2+4s+12}$

Q. 5 **a)** What is correlation between Time domain and Frequency domain specifications? **(04)**

b) Sketch Polar plot for unit F/B system open loop T.F. $G(s) = \dfrac{1}{s(s+2)}$

OR

The open loop T.F. of an unity F/B system is given by **(10)**
$G(s) = \dfrac{1000(1+0.2s)}{s(1+0.1s)}$

Draw bode plot and find phase margin and gain margin.

Q. 6 **a)** What are the control Actions? Explain any on in detail. **(05)**

b) Explain PID controller. **(05)**

OR

Explain ladder diagrams significance using one suitable example by drawing diagram for the same. **(10)**

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