Day : Tuesday		Time : 10.00 AM TO 01.00 PM
Date : 28/05/2019	**S-2019-2637**	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.
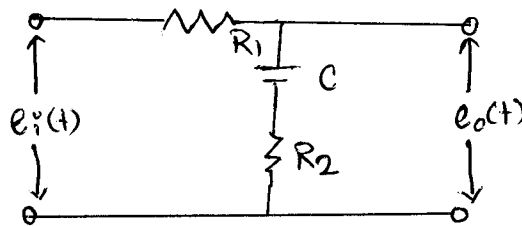

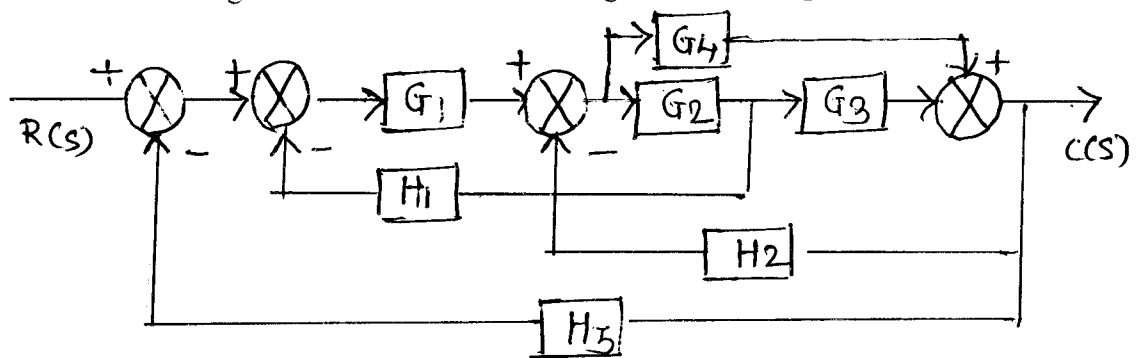**Q. 1   a)**   Find $C(s) / R(s)$ of system shown below: **(06)**
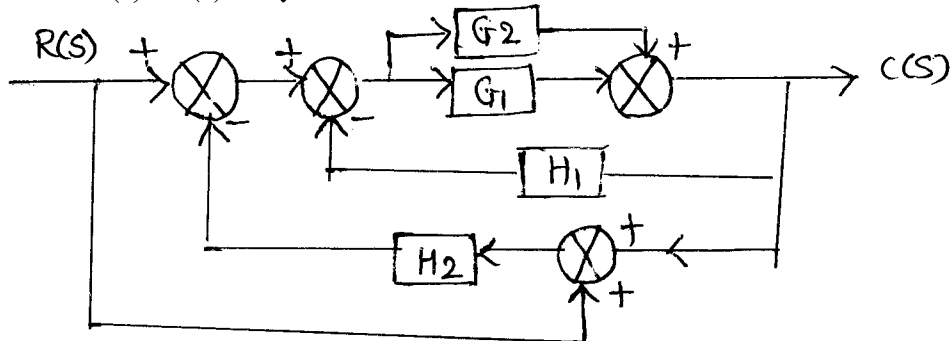
   b)   Derive the expression for T. F. of closed loop system. **(04)**

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)**

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)**
$$G(s) = \frac{k}{s(s+10)} \ .$$
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)**
$$G(s) = \frac{2s+1}{s^2}$$

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 **(03)** having characteristic equation as:
$$s^6 + 2s^5 + 8s^4 + 16s^3 + 20s^2\ 15s + 16 = 0.$$

OR

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

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

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

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)**
$$G(s) = \frac{1000(1+0.2s)}{s(1+0.1s)}$$
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 **(10)** diagram for the same.

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