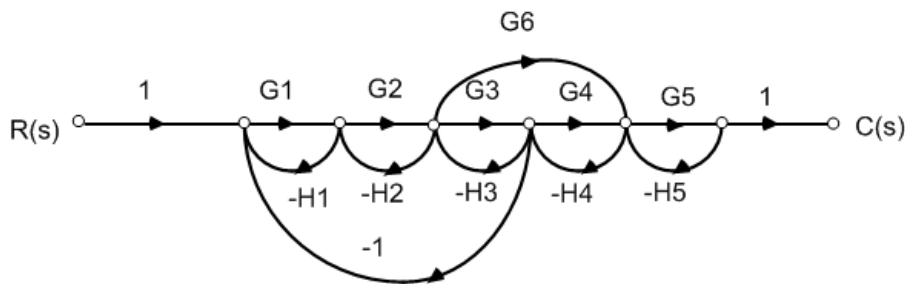


**Set
A**

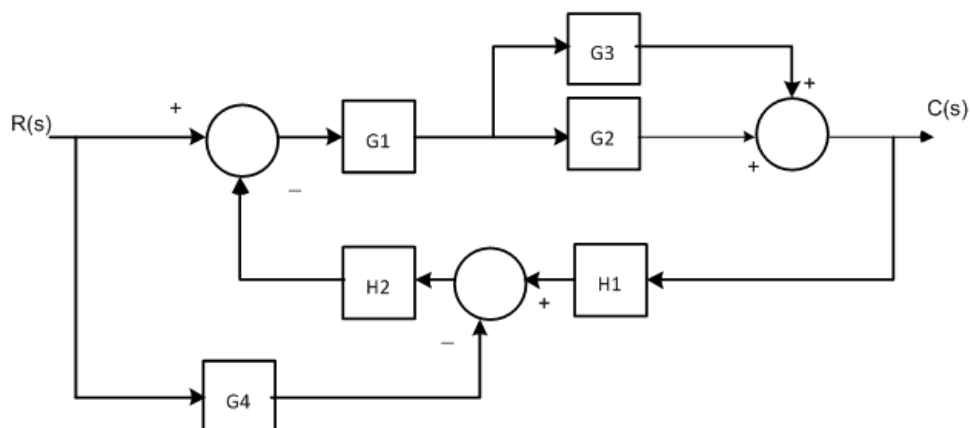
**Time : 3 hrs
Total Marks: 100**

1. a) Differentiate between engineering and Physiological Control Systems. (10 Marks)
- b) Find the overall gain of the system for the signal flow graph below (10 Marks)



OR

2. a) Using block diagram reduction technique, find the closed loop transfer function C/R of the system whose block diagram is shown below. (10 Marks)



- b) The dynamic behaviour of the system described by the equation $\frac{dc}{dt} + 10c = 40e$ where e is the input and c is the output. Determine the transfer function of the system (10 Marks)

3. a) A Unity feed back control system has an open loop transfer function $G(s) = \frac{10}{s(s+2)}$ find the rise time, percentage overshoot, peak time and settling time for a step input of 12 Units. (10 Marks)

b) Obtain the response of second order underdamped system when it is subjected to unit step input. (10 Marks)

OR

4. a) A unity feedback system is characterized by the open-loop transfer function $\frac{C(s)}{R(s)} = \frac{1}{s(0.5s+1)(0.2s+1)}$. Determine the steady state errors for unit-step, unit-ramp and unit-acceleration inputs. (10 Marks)

b) Determine the stability of the system whose characteristic equation is given by $s^5 + s^4 + 2s^3 + 2s^2 + 3s + 5 = 0$ (10 Marks)

5. A Unity feed back control system has an open loop transfer function $G(s) = \frac{k}{s(s^2+2s+13)}$ sketch the Root Locus (20 Marks)

OR

6. Draw the bode plot of the open loop transfer function (20 Marks)

$$G(s) = \frac{10}{s(1+0.4s)(1+0.1s)}$$

7. The open loop transfer function of a unity feed back control system is given by $G(s) = 1/s(1+s)(1+2s)$, Sketch the polar plot and determine the phase margin. (20 Marks)

OR

8. a) Obtain the mathematical model for the regulation of cardiac output. (10 Marks)
b) Explain the concept of stretch reflex with respect to control system concept. (10 Marks)
9. a) Obtain the mathematical model concept of chemical regulation of Ventilation. (15 Marks)
b) Write short notes on the concept of Nyquist Stability Criterion. (5 Marks)