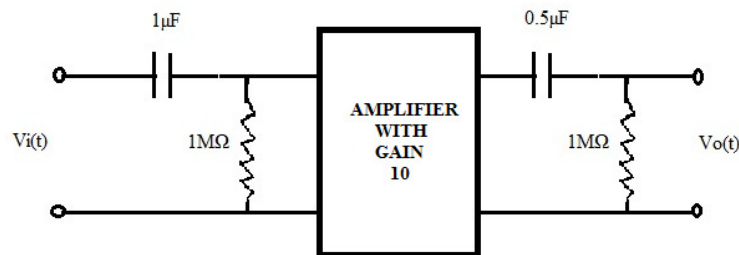


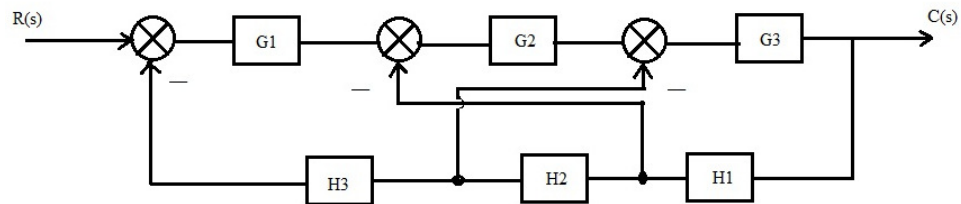
GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – WINTER 2013****Subject Code: 160304****Date: 06-12-2013****Subject Name: Bio Medical Control Theory****Time: 02:30 pm to 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

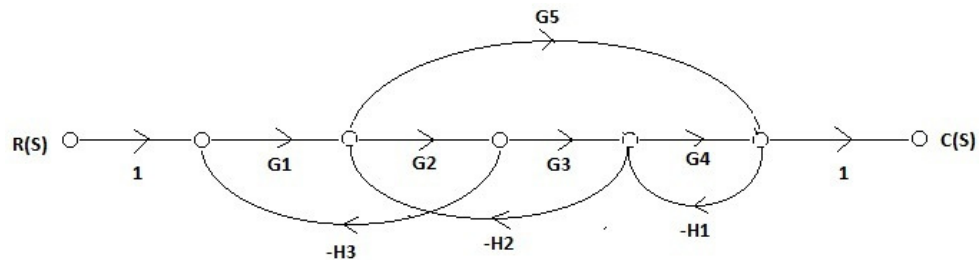
- Q.1** (a) What is Control System? Enlist and Explain the different types of control system in detail. **07**
- (b) Explain the closed loop and open loop system with suitable example. **07**
- Q.2** (a) Derive the transfer function of the system shown in Fig. the amplifier gain is 10. **07**



- (b) Use block diagram reduction methods to obtain the equivalent transfer function from R to C. **07**

**OR**

- (b) What is analogous system? Establish force-current and force-voltage analogy. **07**
- Q.3** (a) Find the transfer function from given signal flow graph. **07**



- (b) What do you understand by time response of any control system. Explain the effect of input on steady state error. **07**

OR

- Q.3 (a)** Write a short note on “Effect of ξ on second order system performance” **07**
- (b)** A system has the following transfer function **07**
- $$\frac{C(s)}{R(s)} = \frac{20}{s+10}$$
- Determine its unit impulse, step and ramp response with zero initial condition. Sketch the response.
- Q.4 (a)** Derive an equation of unit step response of a second order system for an underdamped case. **07**
- (b)** State and explain the Hurwitz’s and Routh’s criterion. Explain the significance of an auxiliary equation. **07**
- OR**
- Q.4 (a)** Apply Routh criterion to check the stability of **07**
- $$s^8 + 5s^6 + 2s^4 + 3s^2 + 1 = 0$$
- (b)** For a unity feedback system, **07**
- $$G(s) = \frac{K(s+10)(s+20)}{s^2(s+2)}$$
- Apply Routh’s criterion and find range of value of K for stability. Find marginal K and corresponding frequency of oscillations.
- Q.5 (a)** A unity feedback control system has $G(s) = \frac{80}{s(s+2)(s+20)}$. Draw the Bode plot. determine G.M. P.M. w_{gc} and w_{pc} . Comment on stability. **07**
- (b)** Sketch the complete root locus for the system **07**
- having $G(s)H(s) = \frac{K}{s(s+3)(s^2+3s+4.5)}$.
- OR**
- Q.5 (a)** Consider a system with open loop transfer function as **07**
- $$G(s)H(s) = \frac{1}{(1+T_1s)(1+T_2s)}$$
- obtain its polar plot.
- (b)** A unity feedback control system has $G(s) = \frac{K}{s(s+6)(s+9)}$. Draw its root locus. **07**
