

## Question Bank (G scheme)

Name of subject: CONTROL SYSTEM

Subject code : 17538

Semester : V

Unit Test: I

Course : IS/IE

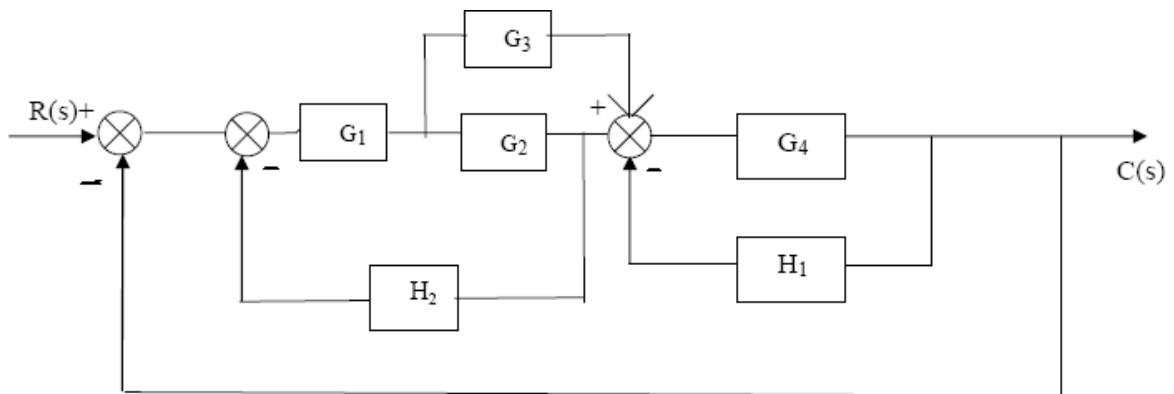
### CHAPTER 1: INTRODUCTION TO THE CONTROL SYSTEM (16 Marks)

#### 3 Marks:

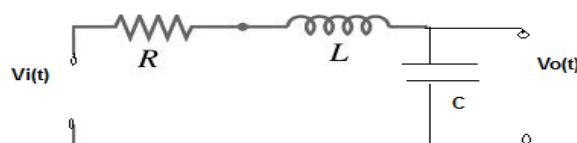
- 1) Define open loop and closed loop system with example.
- 2) Explain the significance of Laplace transform.
- 3) State whether toaster is an example of open loop or close loop system .Justify the same.
- 4) Define order of the system and find order of following system :  
$$G(s)H(s) = \frac{(S+5)}{S(S+2)(S+4)}$$
- 5) Define transient and steady state response with diagram.

#### 4 Marks:

- 6) Derive the transfer function of system using block reduction techniques.



- 7) For the electrical system shown derive the transfer function  $V_o(s)/V_i(s)$

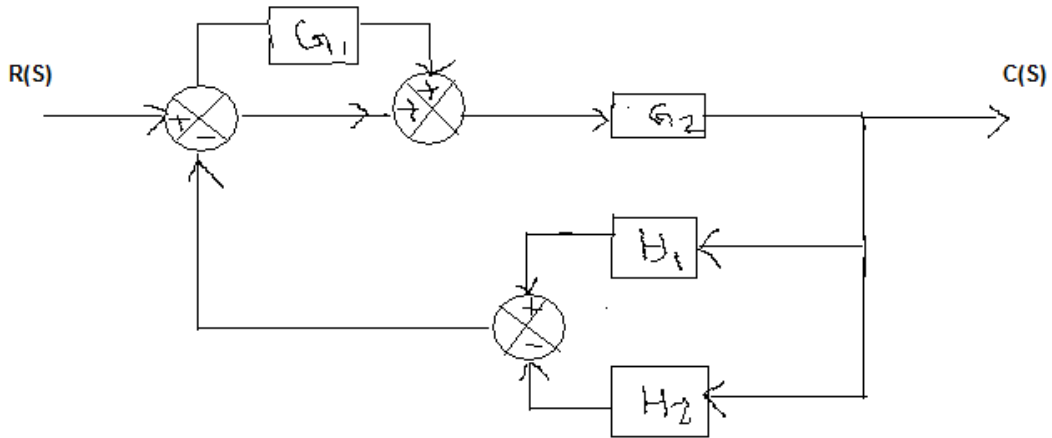


8) Compare open loop and closed loop system.

9) Define transfer function .Derive the transfer function for a general closed loop control system.

10) State any four block diagram reduction rules.

11) Obtain the transfer function of the given system by using block diagram reduction rules.



## CHAPTER 2: TIME –RESPONSE ANALYSIS ( 24 Marks)

### 3 Marks:

12) Define the following terms:

i) poles ii) zeros iii) characteristic equation.

13) For a system having closed loop transfer function as given below, for unit step i/p determine

1)  $w_n$  2) damping factor 3)  $w_d$

$$T(S) = \frac{64}{S^2 + 5S + 64}$$

14) Define steady state error. What is the effect of step and ramp input on steady state error?

15) Define i) damping ratio ii) transient response iii) type of the system

### 4 Marks:

16) For the given transfer function  $C(s)/R(s) = (S+2)/S (S^2+ 2S+ 2) (S^2+7S+12)$ , find poles, zeros, characteristic equation and order of system.

17) Draw the time response of second order under damped control system with neat labeling.

18) Derive unit step response of 1<sup>st</sup> order system. Draw the response.

19) A second order system is given by

$$T(S) = \frac{25}{S^2 + 6S + 25}$$

Determine the following time domain specifications.

i) Rise time ii) peak time iii) settling time iv) peak overshoot

20) Find error coefficients and steady state error for the transfer function

$$G(s).H(s) = \frac{10 (S+1)}{S(S+2)(S+5)}$$

where  $r(t)=3 + 10t$ .

21) What are the standard test signals used in time domain analysis? Draw the waveform of the signals and state the mathematical expression for each.

22) Explain the effect of damping on response of control system.

### CHAPTER 3:- STABILITY (16 Marks)

#### **3 Marks :**

23) Define the following terms:

i) Stable System

ii) Unstable System

iii) Marginally stable system

24) State Routh's stability criterion.

25) State the advantages of Routh's stability criterion.

#### **4 Marks:**

26) Determine the stability of the system whose characteristic equation is given as

$$S^6 + 2S^5 + 8S^4 + 12S^3 + 20S^2 + 16S + 16 = 0$$

27) A system has  $G(s)H(s) = \frac{K}{S(S+2)(S+4)(S+8)}$

where K is positive. Determine the range of 'K' for the system to be stable.

28) Determine the stability of the system whose characteristic equation is given as

$$S^4 + 2S^3 + S^2 + 4S + 2 = 0$$