BT–6/D03

Control System

Paper : EE-304

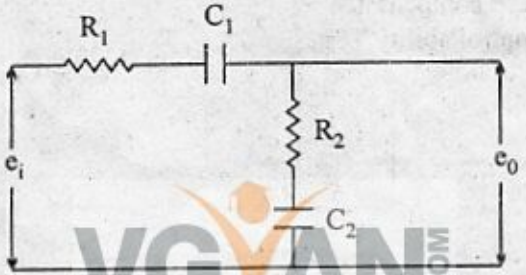
Time : Three Hours] [Maximum Marks : 100

Note : Attempt any five questions ask for Graph & Semilog papers from Centre Supdtt. All questions carry equal marks.

1. (a) Describe the effect of feed back on stability. Can an existing unstable closed loop system be made stable by adding another feed back loop ? If yes, illustrate. 10

   (b) Compare & contrast state space & transfer-function based modelling techniques. 10

2. (a) Derive transfer function of the ckt. below : 15



   (b) What are frequency domain specification, define them ? 5

3. (a) Show, using error coefficients, that as the type of the system increases, the ability of the system to eliminate steady state errors also increases. 13

   (b) Define Time domain specifications. 7

4. (a) Assess system stability for the chr. = n :

$$q(s) = s^5 + s^4 + 4s^3 + 24s^2 + 3s + 63 = 0.$$ 12

   (b) Given transient response to one input (say step), can the transient response to another input (say, impulse) be obtained for an LTI system. If yes, how ? 8

5. Draw root locus, given that : 20

$$G(s)H(s) = \frac{K}{s(1+s/2)(1+s/6)}.$$

Also find :

(a) Value of K for system to be unstable.

(b) Value of K for critical damping.

(c) Value of K to give unit step response of the underdamped system corresponding to J = 0.5.

6. Construct Bode plot for : 20

$$G(s)H(s) = \frac{10(s+50)}{s(s+5)(s+10)}.$$

Define GM & PM also.

7. Sketch a Nyquist plot for a system whose G(s) H(s) is given as : 20

$$\frac{K(1+0.5s)(s+1)}{(1+10s)(s-1)}$$

Find whether closed loop system is stable or not ?

8. Write technical notes on :
   (a) PID control 5
   (b) Lead compensater 8
   (c) Controllability Tests. 7