B.Tech.(Electronics Engg.) (2012 onwards)

(ECE)/(EE) (Electrical & Electronics)

(Electronics & Computer Engg.)/(Electronics & Electrical)/(ETE) (2011 onwards)

(Electrical Engineering & Industrial) (2012 Batch)

(Sem.–4)

LINEAR CONTROL SYSTEMS

Subject Code : BTEE-402

Paper ID : [A1188]

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.
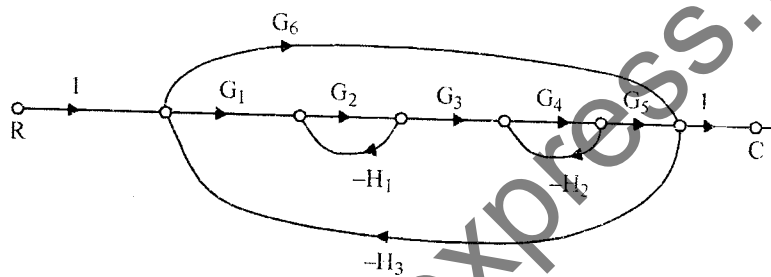
SECTION-A

1. Write briefly :

   (a) Write in short the effect of feedback on sensitivity of control system.

   (b) Define open loop and closed loop control system. Give examples.

   (c) Define transfer function and characteristic equation of a control system, with the help of an example.

   (d) Write the expressions for angle of asymptotes and centroid in root locus.

   (e) Define different types of compensating techniques.

   (f) Compare continuous and discrete control systems. Give examples.

   (g) What is State Transition Matrix? Write its various properties.

   (h) Define gain cross over frequency and phase cross over frequency and relate them with stability of a system.

   (i) Make analogous table for rotational mechanical system and series RLC circuit.

   (j) Define various static error coefficients.

SECTION-B

2. Find the time response specifications for a unity feedback control system having open loop transfer function as $\dfrac{144}{s(s+2)}$.

3. Write short note on ac servomotors.

4. Explain various frequency domain specifications.

5. Determine the range of K for the system to be stable using R-H criterion. The characteristic equation is $s(s^2 + 2s + 3)(s + 2) + K = 0$.

6. Find the overall transfer function for the following signal flow graph :

SECTION-C

7. Draw Nyquist criterion and discuss stability for the following system :

$$G(s) = \frac{1}{s(1+2s)(1+s)}.$$

8. Explain and discuss in detail the various steps to draw a root locus. Also discuss its various applications.

9. For a closed loop control system, $G(s) = \dfrac{K}{s(s+4)(s+10)}$. Draw Bode Plot. Find K when GM is equal to 10 dB.