H.T.No. | | | | | | | | | | |

Code No: EC1524 **GEC-R14**

II B. Tech II Semester Supplementary Examinations, January 2017

CONTROL SYSTEMS

(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 60**

Note: All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **PART-B.** All Questions carry equal Marks.

PART-A

6 × 2 = 12M

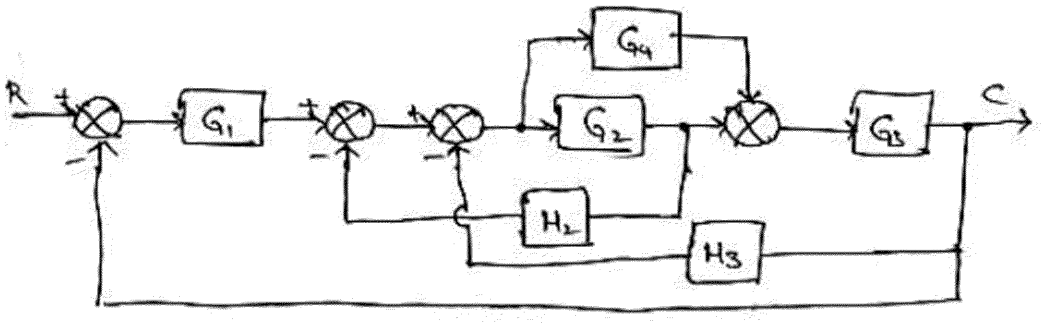
1. Write the advantages of feedback control system.
2. Define steady state error.
3. What is Routh's stability criterion?
4. What are the advantages of Bode plot?
5. State any four properties of State Transition Matrix.
6. Explain sampler and holding operation.

PART-B

4 × 12 = 48M

1. a) Define closed loop system with an example. (4M)

   b) Simplify the block diagram shown in figure below and obtain the transfer function C(s)/R(s). (8M)



2. a) For a unity feedback system given by G(s) = $\frac{20\,(s+2)}{s\,(s+3)(s+4)}$ (9M)

   i) Find the steady state error constants

   ii) Find the steady state error for r(t) = 3 u(t) + 5 t u(t)

   b) Explain about standard test signals. (3M)

3. a) List out the procedural steps used to construct the Root Locus. (6M)

   b) Derive the transfer function of lead compensator and draw its pole-zero plot. (6M)

4. The open loop transfer function of a unity feedback system is given by $G(s) = \frac{1}{s(1+s)(1+2s)}$.

   Sketch the polar plot and determine the gain margin and phase margin. (12M)

5. a) Derive the solution for a homogeneous state equation. (4M)

   b) Obtain the transfer function if $\begin{bmatrix} \dot{x_1} \\ \dot{x_2} \end{bmatrix} = \begin{bmatrix} -5 & -1 \\ 3 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 2 \\ 5 \end{bmatrix} u;\ y = [1 \quad 2] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$ (8M)

6. Explain in detail about the spectrum analysis of sampling process? (12M)

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