

C.U.SHAH UNIVERSITY

Winter Examination-2015

Subject Name: Linear Control Theory

Subject Code: 4TE05LCT1

Branch: B.Tech(EEE,EE,IC)

Semester: 5 Date: 04/ 12 /2015 Time: 02:30 To 5:30 Marks: 70

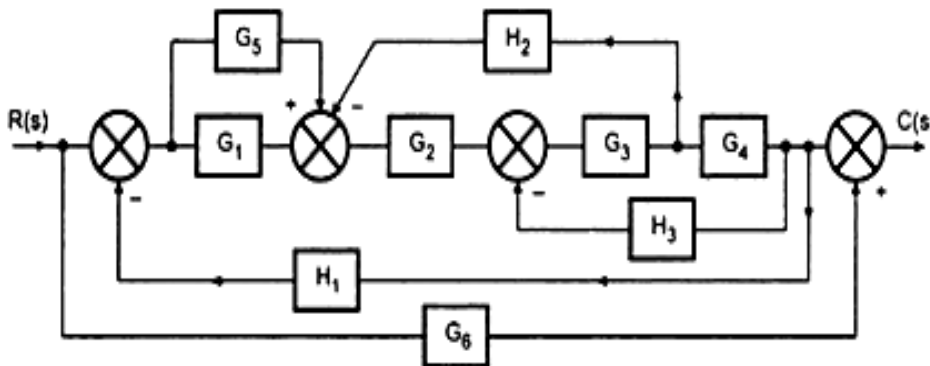
Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

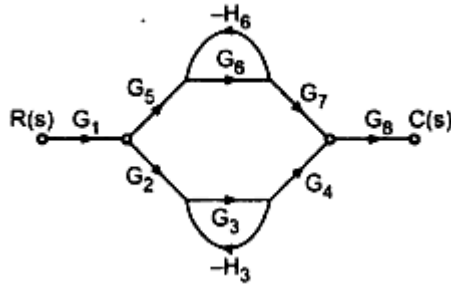
- Q-1 Attempt the following questions: (14)**
- | | | |
|-----------|--|---|
| a) | Define Transfer Function. | 1 |
| b) | What is analogous system? | 1 |
| c) | What is root locus? | 1 |
| d) | Explain Source, sink, feedback loop and self loop. | 2 |
| e) | Define the Term | 9 |
- i)Time Response ii)Transient Response iii)Steady state response iv)steady state error
v)Delay time vi) Rise time vii)Peak Time viii)Phase margin ix) Gain margin

Attempt any four questions from Q-2 to Q-8

- Q-2 Attempt all questions (14)**
- A** Write short notes on open loop control systems and closed loop control Systems with the help of neat block diagrams. Explain role of each of the blocks.
- B** Explain about liquid level system giving suitable example. Obtain its transfer function.
- Q-3 Attempt all questions (14)**
- A** Obtain the transfer function C/R for the block diagram shown in the fig



B Find $C(s)/R(s)$ by Mason's Gain Formula

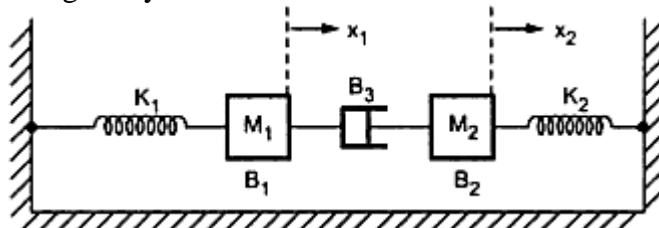


Q-4

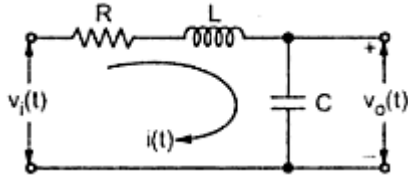
Attempt all questions

(14)

A Write the equilibrium equation for the mechanical system and obtain the F-I analogous system.



B Obtain the state model of the given electrical system.



Q-5

Attempt all questions

(14)

A Find the stability of given equation using Routh's method. $S^5 + S^4 + 2S^3 + 2S^2 + 3S + 5 = 0$

B State the advantages and limitations of Routh's method.

Q-6

Attempt all questions

(14)

A Derive the expression for static error coefficient.

B A unity feedback system has $G(S) = 40(S+2)/S(S+1)(S+4)$

Determine i) Types of the System ii) All error coefficients and iii) Error with ramp input with magnitude 4.

Q-7

Attempt all questions

(14)

A A feedback control system has an open loop transfer function

$G(S) = K/(S+3)(s^2+2s+2)$ Find the root locus as $K \rightarrow 0$ to ∞

B State the advantages of the root locus technique.

Q-8

Attempt all questions

(14)

A Draw the bode plot for

$G(S) = 10(1+0.5S)/S(1+0.1S)(1+0.2S)$ Also find phase and gain margin.

B State the advantages of bode plots.

