Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name: Control System Engineering

Subject Code: 4TE04CSE1 **Branch: B.Tech (EC)**

Semester: 4 **Date: 11/05/2017** **Time: 02:00 To 05:00** **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 linear system.	1
b)	What is time invariant system?	1
c)	Define transient response.	1
d)	What is steady state response?	1
e)	What is rise time?	1
f)	What mean by critically stable system?	1
g)	Define centroid.	1
h)	Draw close loop transfer function and write it's TF function.	1
i)	State any two advantages of digital control system over a continuous data control system	1
j)	Write the equation of rotational system for inertia and damper	1
k)	Define Break away point.	1
l)	Define gain margin.	1
m)	State the advantage of lead compensation.	1
n)	What is asymptote?	1

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

Q-2 **Attempt all questions** **(14)**

1.	What is Close loop Control System? Explain Missile launching and guidance system with neat sketch	**07**
2.	Compare Closed loop system and open loop system	**04**
3.	State advantages and limitations of Routh's stability criterion.	**03**

Q-3 **Attempt all questions** **(14)**

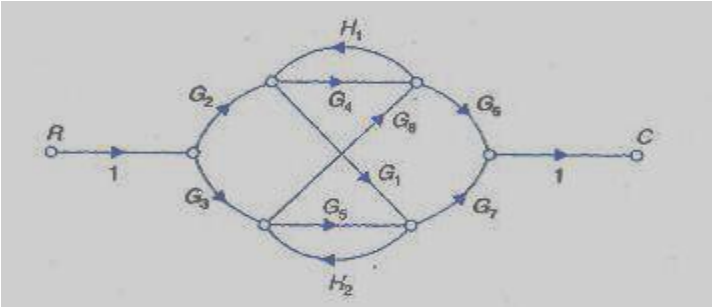
1.	Explain servomechanism system with suitable example	**07**
2.	State the advantages and disadvantages of transfer function	**04**
3.	Explain Mason's gain formula.	**03**

Q-4 **Attempt all questions** **(14)**

1. Feedback control system has an open loop transfer function Find the root locus **07**

$$G(s)=\frac{K}{s(s+1)(s+3)(s+4)}.$$

2. Obtain the overall transfer function C/R of the system whose signal flow graph shown in figure below **07**



Q-5 **Attempt all questions** **(14)**

1. State and explain Nyquist stability criterion. Write advantages and limitations of the Nyquist stability criterion **07**

2. Define steady state error and derive the expressions for error constants Kp Kv, and Ka corresponding to step, ramp and parabolic input respectively **07**

Q-6 **Attempt all questions** **(14)**

1. What is Bode plot? Write the procedure to Bode plot with example. **08**

2. State and explain compensator? Explain Phase-Lead compensator **06**

Q-7 **Attempt all questions** **(14)**

1. The characteristics equation of servo system is given by **07**

$$a_0 s^4 + a_1 s^3 + a_2 s^2 + a_3 s + a_4 = 0$$

Determine the conditions which must be satisfied by the coefficient of the characteristics equation for the system to be stable. (a0 > 0)

2. Explain standard signals with its necessity. **07**

Q-8 **Attempt all questions** **(14)**

1. Using Routh's criterion check the stability of a system whose characteristic equation is given by $s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$ **07**

2 Using block diagram reduction technique find the closed loop transfer Function of the system whose block diagram is given in figure below **07**