C.U.SHAH UNIVERSITY
Winter Examination-2018

Subject Name: Control System Engineering

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

Semester: 4   Date: 29/10/2018   Time: 10:30 To 01:30   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 linear system.
b) State the condition for stable system.
c) Define rise time.
d) What is feedback? Explain its effects of feedback.
e) What is non touching loop?
f) Define Transfer function.
g) What is peak time?
h) State the limitation of transfer function.
i) Define steady state error.
j) State the advantage of lead compensation.
k) Define gain margin.
l) What is asymptote?
m) State the limitation of Routh's stability.
n) Define Break away point.

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

Q-2   **Attempt all questions**   **(14)**
(a) What is Bode plot? Write the procedure to Bode plot and draw it.
(b) Explain Missile launching and guidance system with neat sketch.

Q-3   **Attempt all questions**   **(14)**
(a) Write comparative note on open loop control systems and closed loop control systems. Discuss their advantages and disadvantages.
(b) State and explain Nyquist stability criterion. Write advantages and limitations of the Nyquist stability criterion

Q-4   **Attempt all questions**   **(14)**
(a) Explain Routh's stability in detail.

(b) Why compensator is required? Explain Phase-lead compensator in detail

Q-5 **Attempt all questions** (14)
(a) Explain different types of signals which is used in control system.
(b) What do you mean by a polar plot? What is the advantage of polar plots? What is the inverse polar plot?

Q-6 **Attempt all questions** (14)
(a) Give comparison of signal flow graph and block diagram method.
(b) The characteristics equation of servo system is given by
$a_0 s^4 + a_1 s^3 + a_2 s^2 + a_3 s + a_4 = 0$
Determine the conditions which must be satisfied by the coefficient of the characteristics equation for the system to be stable. $(a_0 > 0)$

Q-7 **Attempt all questions** (14)
(a) Determine the stability of the system whose overall transfer function is given by

$$\frac{C(s)}{R(s)} = \frac{2s + 5}{s^5 + 1.5s^4 + 2s^3 + 4s^2 + 5s + 10}$$

If the system is found unstable, how many roots it has with positive real parts?
(b) Explain servomechanism system with suitable example.

Q-8 **Attempt all questions** (14)
(a) Define steady state error and derive the expressions for error constants Kp Kv, and Ka corresponding to step, ramp and parabolic input respectively
(b) What is linear time invariant system? Explain in detail with suitable example.