

Enroll No

K.E.Society's
Rajarambapu Institute of Technology, Rajaramnagar
 (An Empowered Autonomous Institute, affiliated to SUK)
Unit Test - II (2025-26)

Q.P. Code
UT 3101

T.Y. B.Tech.-Electrical Engineering

Course Code: EE313

Course Name: Feedback Control System

Day & Date: Thursday 18/09/2025

Time: 2:30 To 3:30

Max Marks - 25

- Instructions:**
- 1) All questions are compulsory.
 - 2) Figures in rounded () brackets within the question, indicate the scheme of marking for respective part of the question, whereas, figures in the first right column indicate total marks for that whole question.
 - 3) CO is the index number of the Course Outcome statement.
 - 4) The Bloom's taxonomy level (BL) for 1,2,3,4,5 and 6 is remember, understand, apply, analyze, evaluate and create respectively.
 - 5) Assume suitable data if necessary.
 - 6) Use of non-programmable calculators is allowed

- | | Marks | BT Level | COs |
|---|-------|----------|-----|
| Q.1 A The open loop transfer function (OLTF) of a unity feedback system is given by $G(s) = \frac{k}{s(\tau s + 1)}$ where k and τ are positive constants. By what factor should the amplifier gain be reduced (7M) so that the peak overshoot of unit step response of the closed loop system is reduced from 30% to 15%. | 07 | 3 | CO2 |

OR

The open loop transfer function of a system shown in Fig. 1. is,

$$G(s) = \frac{20}{(s+2)(s+3)}$$

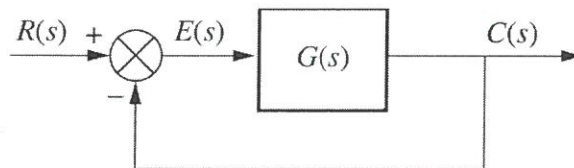


Fig. 1. A control system block diagram for Q. 1. A

Determine the damping ratio (2M), maximum overshoot (1M), rise time (2M), peak time (1M) and settling time (1M).

- | | | | |
|---|----|---|-----|
| B For a unity feedback system, the OLTF | 06 | 3 | CO2 |
|---|----|---|-----|

$$G(s) = \frac{5(s+2)}{s^2(s+1)}$$

Find position, velocity & acceleration error constants (3M). Also calculate the steady-state error (3M) for the same when the input is,

$$R(s) = \frac{5}{s} - \frac{1}{s^2} + \frac{2}{s^3}$$



- Q.2 A Determine the stability (4M) of the system with closed loop transfer function,

$$\frac{C(s)}{R(s)} = \frac{10}{s^6 + 2s^5 + 2s^4 + 3s^3 + 5s^2 + 6s + 1}$$

Comment (1M) on the location of closed loop poles on s-plane.

- B For a unity feedback system, draw the pole-zero plot (1M) for the following OLTF,

$$G(s) = \frac{K(s+1)}{s(s+2)(s+4)}$$

Also on the plot, show where the root locus is present (1M), calculate the centroid and asymptote angles (2M).

- C Using *Routh's* criterion, determine the range of K for the system to be stable (3M) for,

$$G(s) = \frac{K}{s(s+2)(s+3)}; \quad H(s) = 1$$

