

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

[Total No. of Questions: 09]

[Total No. of Pages: 02]

Uni. Roll No. ....

Program: B.Tech. - ECE

Semester: 4

Name of Subject: Linear Control Systems

Subject Code: PCEC-109

Paper ID: 16225

Scientific calculator is Allowed

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

**Part – A**

[Marks: 02 each]

Q1.

- a) Illustrate the applications of servo motors.
- b) Find the Laplace transform of unit ramp and unit impulse signal.
- c) Identify the advantages and disadvantages of adding phase lag-lead compensator.
- d) If closed loop poles are present on many points of imaginary axis, how does it influence stability?
- e) Compare open and closed loop systems.
- f) Examine the significance of poles and zeros in control system.

**Part – B**

[Marks: 04 each]

- Q2. Explain the construction, principle and working of potentiometer. How is it used as error detector?
- Q3. What are the necessities of compensation networks?
- Q4. Explain how a temperature control system works and obtain its mathematical equations.
- Q5. Distinguish between time variant and time invariant systems.

- Q6. Develop an expression for unit step response for a second order system.
- Q7. Determine the time response of a first order control system subjected to unit ramp input signal.

Part – C

[Marks: 12 each]

- Q8. Identify the different components of a control system. Explain with diagrams different types of control systems.

OR

Construct the root locus plot for the system having open-loop transfer function is given by

$$G(s)H(s) = \frac{K}{s(s + 4)(s^2 + 4s + 13)}$$

- Q9. Determine the transfer function relating C and R for the block diagram given in Fig. 1. Use Mason's gain formula.

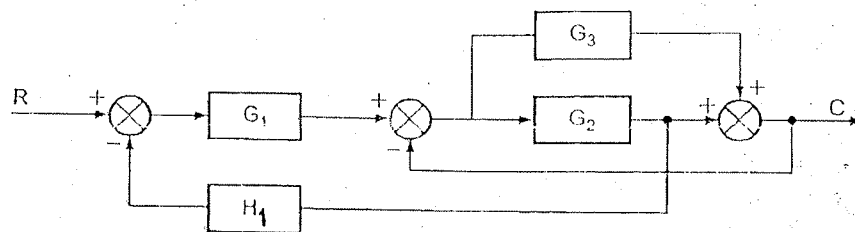


Fig. 1

OR

Sketch the asymptotic Bode plot for the transfer function given below:

$$G(s)H(s) = \frac{2(s + 0.25)}{s^2(s + 1)(s + 0.5)}$$

From the Bode plot, determine the following:

- a. phase crossover frequency
- b. gain crossover frequency
- c. gain margin
- d. phase margin
- e. stability

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