Reg. No. : | | | | | | | | | | |

Question Paper Code: 34501

B.E. / B.Tech. DEGREE EXAMINATION, AUGUST 2021

Fourth Semester

Electronics and Instrumentation Engineering

01UEI401 – CONTROL ENGINEERING

(Regulation 2013)

Duration: 1:45 hour Maximum: 50 Marks

PART A - (10 x 2 = 20 Marks)

(Answer any ten of the following questions)

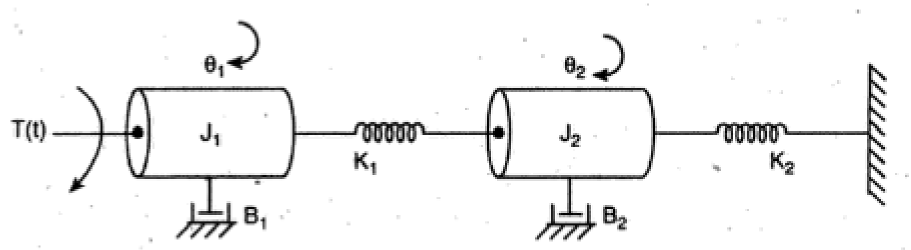
1. Compare open loop and closed loop control system.
2. State the rule for shifting the summing point ahead of a block.
3. Define steady state error.
4. What is positional error coefficient? Explain.
5. What are the frequency domain specifications?
6. What is compensator?
7. State Nyquist stability criterion.
8. Define centroid.
9. Define sampling theorem.
10. Write the solution of homogeneous state equations.
11. Draw the circuit of lead compensator and draw its pole-zero diagram.
12. State Nyquist stability criterion.
13. Give the expression for finding the ‘centroid’ in the construction of root locus.
14. Define sampling theorem.

15. Mention the need of state variables

PART – B (3 x 10= 30 Marks)

(Answer any three of the following questions)

16. For the mechanical system shown in figure write the differential equations and hence find $\frac{\theta_2(s)}{T(s)}$. (10)



17. The open loop transfer of a feedback control system with unity feedback given by

$$G(s) = \frac{40}{s(1+0.5s)}$$

Find the error constants for the system. Also obtain the steady state error when the input is $r(t) = 1 + 5t + 10t^2$. (10)

18. The open loop transfer function of unity feedback system is given by $G(s) = \frac{10(s+2)}{s(s+1)(s+3)}$. Sketch the polar plot and determine the gain margin and phase margin. (10)

19. Sketch the root locus for the unity feedback system whose open loop transfer function is given by $G(s) = \frac{K}{s(s^2+6s+10)}$. Determine the range of 'K' for which the system to be stable. (10)

20. A LTI system is characterized by the state equation

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

Where 'u' is a unit step function. Compute the solution of these equation assuming initial condition $x_0 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ (10)

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