Please check that this question paper contains_____ questions and _____ printed pages within first ten minutes.

[Total No. of Questions: 09] [Total No. of Pages: 02]

Uni. Roll No. .....

Program: B.Tech. (Batch 2018 onward)
Semester: 5
Name of Subject: Control Systems
Subject Code: PCEE-110
Paper ID: 16462
Scientific calculator is Allowed

MORNING
10 MAY 2023

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) Write the formula for rise time and peak time.
b) Give the benefits of closed loop control systems.
c) List the standard test signals used for analysis in control systems.
d) Differentiate continuous time and discrete time systems.
e) Give the significance of time constant form in view of transfer function.
f) The ramp input is applied to a unity feedback system of type 1 and zero frequency 20. Calculate the percentage of steady state error.

Part – B **[Marks: 04 each]**

Q2. Discuss about transfer function. Give the importance of impulse response in a transfer function.

Q3. Differentiate between open loop and closed loop control systems with appropriate example.

Q4. Give the importance of state transition matrix in state variable analysis.

Q5. A unity negative feedback system has the open loop transfer function $G(s) = \frac{K}{s(s+1)(s+3)}$

Find the value of Gain K , where the root locus crosses the imaginary axis.

Q6. Calculate open loop transfer function of a system having impulse response as $-te^{-t} + 2e^{-t}$, $(t > 0)$

Q7. Determine the Routh Hurwitz Stability criterion for given characteristics equation as $s^4+8s^3+18s^2+16s+5=0$

Part – C **[Marks: 12 each]**

Q8. Evaluate the time response of a first order control system subjected to unit ramp input function.

OR

Explain in detail the effect of proportional and derivative control actions on the performance of a second order system.

Q9. The open loop transfer function is given by $G(s)= \frac{K}{s(1+0.1s)(1+0.2s)}$, Design a lead-lag compensator to meet $K_v = 100$/sec and phase margin $\geq 30^o$.

OR

Deduce the transfer function of Lead, Lag and Lag-Lead Compensators from their electrical networks. Also discuss about the observations from Bode Plot for Lag-Lead Compensator .

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