

Total No. of Questions : 4]

SEAT No. :

PF206

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APR-26/SE/Insem-252

S.E. (Electronics/E & TC Engineering) (Electronics & Computer Engg.)/(Electronics Engg. - VLSI Design & Technology) (Electronics & Communication-Advanced Communication Technology) (Insem)

CONTROL SYSTEMS

(2019 Pattern) (Semester - IV) (204192)

Time : 1 Hour]

[Max. Marks : 30

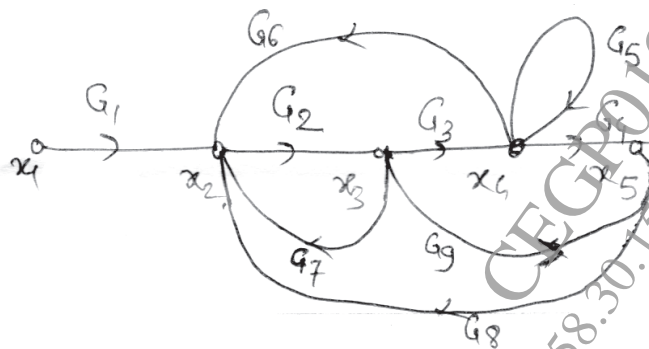
Instructions to the candidates:

- 1) Solve Q.1 or Q.2 and Q.3 or Q.4.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.

- Q1) a) Explain Concept of Transfer function? What are the conditions or Limitations of Transfer function approach? [4]
- b) Calculate Transfer function of following electrical network. [5]



- c) Calculate Masson's Gain of following Signal flow Graph $C(S)/R(S)$. [6]

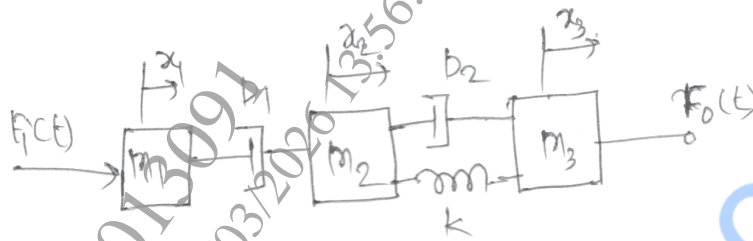


OR

P.T.O.

Q2) a) Write Force-Torque-Voltage analogy. [4]

b) Calculate Transfer function of following Mechanical Network. [6]



c) Reduce the given block Diagram using Block Diagram reduction rule and calculate Transfer function. [5]



Q3) a) Explain Concept of Poles and Zeros of Systems. [3]

b) The open loop transfer function of the system is [7]

$$G(s) H(s) = \frac{10(s+2)(s+3)}{s(s+1)(s+5)(s+4)}$$

Evaluate type of system, error coefficients K_p , K_v and K_a . Find steady state error when input is $r(t) = 3 + t + t^2$

c) A control system is described by the differential equation [5]

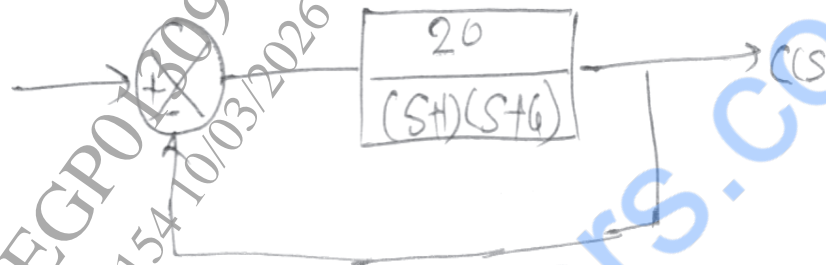
$$\frac{d^2 y(t)}{dt^2} + 7 \frac{dy(t)}{dt} + 12y(t) = 12x(t).$$

Find its output response for unit step input.

OR

Q4) a) Explain Type and Order of the System. [3]

b) For the System shown in figure, Obtain Close loop Transfer function, Damping ratio, Natural frequency of oscillation and expression for output response if subjected to step input [7]



c) For the system with closed loop transfer function [5]

$$G(s) = \frac{25}{s^2 + 8s + 25}$$

Determine damping factor, undamped natural frequency, rise time, peak time, peak Overhoot and settling time with 2% tolerance band?