PRN:		Course Code :	MET 2703

Final Year **B. Tech** End Semester Examination Winter 2023

Automatic Control System

Day and Date: Saturday, 02/12/2023 Max Marks: **50**

Time : 2-00 to 4-00 PM Duration: **02** hrs

Instructions: All questions are compulsory.

Q.1	**Attempt any two from the following**	Marks	Bloom's Level	CO
a)	What are the advantages and disadvantages of closed loop systems?	06	2	CO1
b)	Describe the series mechanical elements and find the equivalent impedence of given system shown in fig 1 (a).	06	1	CO1

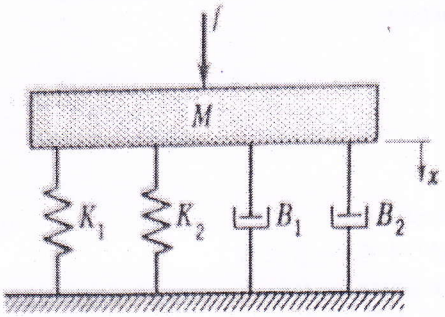


Fig 1(a)

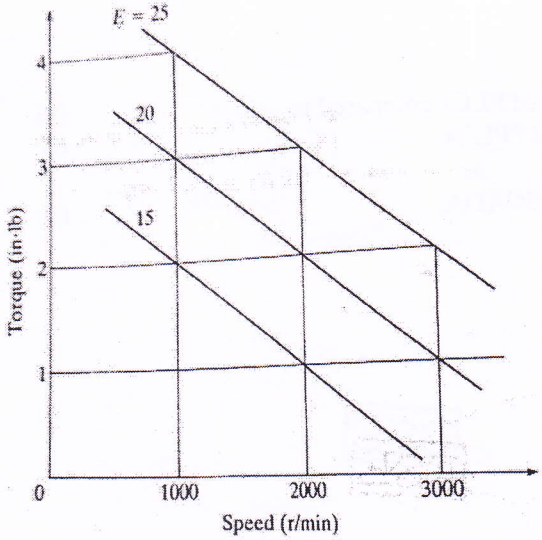


Fig 2(a)

c)	What are the analogous systems? Explain the force-current analogy.	06	1	CO1

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Q.2 **Attempt any two from the following**

a) Typical operating curves for dc motor are shown in fig 2(a). These are curves of torque T versus operating speed N for constant values of voltage E applied to the motor. These curves are plot of the function N=N (T, E). Effect a linear approximation for N. Evaluate the partial derivatives in this approximation when Ti is 2 Nm & Ei is 20V — 06 | 2 | CO2

b) Explain the linearization of nonlinear function with suitable example. — 06 | 2 | CO2

c) For sonic flow of air through a restriction, the mass rate of flow is — 06 | 2 | CO2

$$M = \frac{0.04AP}{\sqrt{T}}$$

Where, M= mass rate of flow kg/s
T=Inlet temp, K
A=Area of restriction, m^2
P=Inlet pressure, N/m^2
Determine the linearized approximation for the variation m when the inlet temp T is constant.

Q.3 **Attempt the following**

a) Examine the stability of the system — 06 | 2 | CO3

$$S^4 + 2S^3 + 8S^2 + 4S + 3 = 0$$

b) Draw the pole-zero plot of the given system — 07 | 2 | CO3

$$X(s) = \frac{s^2 + 3s + 2}{(s+4)(s^2 + 6s + 25)}$$

or

b) Explain the root locus technique. — 07 | 2 | CO3

Q.4 **Attempt the following**

a) What are the advantages of PLCs compared to relays? — 06 | 2 | CO4

b) Explain the applications of PLCs. — 07 | 1 | CO4

or

b) Describe the working of SCADA. — 07 | 2 | CO4

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