Reg. No.: 22BPS1101

Name :

VIT CHENNAI

Continuous Assessment Test - I (CAT 1) – Aug 2024

Programme	:	B.Tech.			
Course	:	Control Systems	Semester	:	Fall 2024 – '25
			Code	:	BEEE303L
Faculty	:	D. R. Binu Ben Jose	Class Nbr	:	CH2024250101911
Time	:	09.30 a.m. to 11.00 a.m.	Slot	:	F1+TF1
			Max. Marks	:	50

Part A. Answer all the questions

1. Write the differential equations governing the mechanical rotational system shown in Fig. 1 and determine the transfer function $\theta(s)/T(s)$. 10

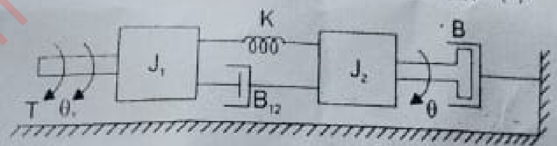

Fig. 1.

2. Using block diagram reduction technique obtain C(s)/R(s) for the block diagram shown in Fig. 2. 10

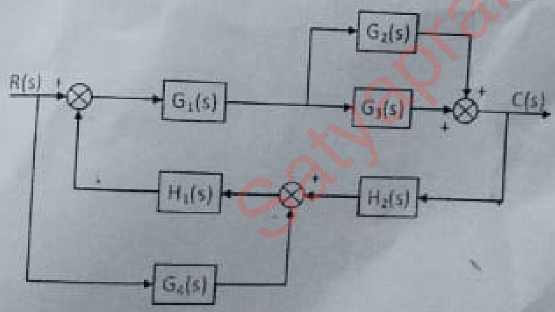

Fig. 2.

3. For the system shown in Fig. 3, find *J and D to yield 20 %* overshoot and a settling time of 2 seconds for a step input of torque *T(t)*. 10

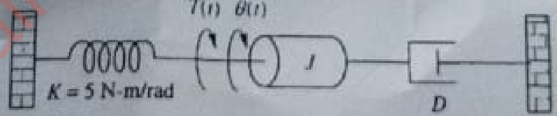

Fig. 3.

4. Assuming a general second order system subjected to unit step input, derive an expression for it's rise time. 10

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5. Consider the unity feedback configuration shown in Fig. 4. Determine the range of values the scalar gain K can take, for which the closed-loop system is stable using Routh Hurwitz stability criterion.

Fig. 4.

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