Reg. No.:

Name :

VIT

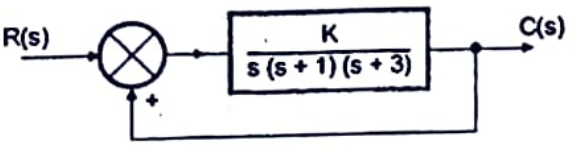
Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test – II – March 2023

ogramme	:	B.Tech (ECE)	Semester	:	Winter 2022-23
ourse	:	Control Systems	Code	:	BECE302L
			Slot	:	C2+TC2
culty	:	Dr. Ashis Tripathy Dr. Mangal Das Dr. Sunil Kumar Pradhan Dr. Vipul Dixit Dr. Niraj Kumar	Class Nbr(s)	:	CH2022235000490 CH2022235000493 CH2022235000495 CH2022235000497 CH2022235000498
me	:	90 Minutes	Max. Marks	:	50

Answer ALL the questions

.No.	Sub. Sec.	Question Description	Marks
1.		Let's consider a system having a forward path transfer function G(s) = 16/[s(s+1)] and unity feedback.	
	(a)	Determine the value of damping ratio and undamped natural frequency.	[2]
	(b)	If tachometer feedback is introduced, the feedback path transfer function becomes (1+Ks). In this consideration, what should be the value of K to obtain the damping ratio of 0.6.	[2]
	(c)	Also, calculate the percentage peak overshoot, 1st undershoot, peak time, and settling time within 2% of the final value.	[6]
2.		An unmanned automatic vehicle is represented by an open loop transfer function of a unity feedback control system is given by $$G(s) = \frac{1}{(S^6 + 3S^5 + 4S^4 + 6S^3 + 6S^2 + 3S + 1)}$$ Determine number of roots in the imaginary axis, right and left half of s-plane using R-H criteria. Also determine the system stability of unmanned automatic vehicle.	[10]
3.		Sketch the root locus for positive feedback system shown below. Find the Kmarginal and comment on the stability. 	[10]

4. A LTI system (whose open-loop transfer function is given below) is supposed to work only with sinusoidal input, moreover it is difficult to calculate transfer function of the system. Can you suggest the best possible method to study the stability of the system? Draw the polar plot of system and calculate the gain crossover frequency and phase margin of the closed loop system. **[10]**

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

5. Sketch the Nyquist plot and examine the closed-loop stability of a control system having open loop transfer functions given below: **[10]**

$$G(s)H(s) = \frac{20}{(s+1)(0.25s+1)(0.4s+1)}$$

Total Marks **[50]**

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