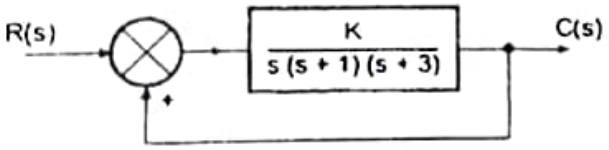
VIT

Vellore Institute of Technology

Continuous Assessment Test II – June 2023

ogramme	: B.Tech (ECE)	Semester	: Fall Inter 2022-23
urse	: Control Systems	Code	: BECE302L
		Class Nbr	: CH2022232500122
culty	: Dr. Sunil Kumar Pradhan	Slot	: C1+TC1
me	: 90 Minutes	Max. Marks	: 50

Answer ALL the questions

Q.No.	Sub. Sec.	Questions	Marks
1.		Let's consider a servo system whose characteristics equation is given by $a_0s^4+a_1s^3+a_2s^2+a_3s+a_4=0$. Determine the conditions which must be satisfied by the coefficients of the characteristics equation for the system to be stable.	10
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 the 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 in Figure 1. Find the K and comment on the stability.  **Figure 1**	10
4.		An LTI system (whose open-loop transfer function is given below) is supposed to work only with sinusoidal input. Moreover, it is difficult to calculate the transfer function of the system for non-sinusoidal input. 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. $G(s)H(s) = \frac{(s+4)}{(s+1)(3s+1)}$	10

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

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

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