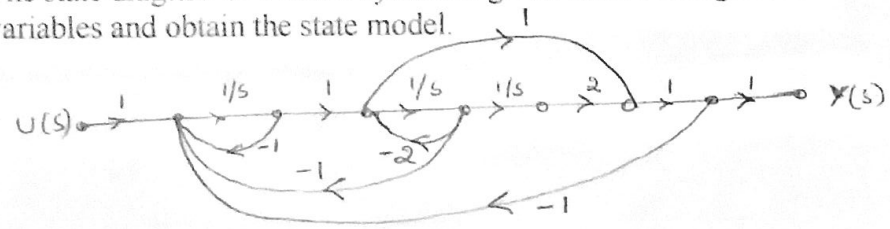
Vivekananda College of Engineering & Technology, Puttur
[A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®]
Affiliated to VTU, Belagavi & Approved by AICTE New Delhi

CRM08	Rev 1.10	EC	26/08/2022

CONTINUOUS INTERNAL EVALUATION- 3

Dept:EC	Sem / Div:IV	Sub:Control Systems	S Code:18EC43
Date:01-09-2022	Time: 9:30-11:00 am	Max Marks: 50	Elective:N

Note: Answer any 2 full questions, choosing one full question from each part.

Q N		Questions	Marks	RBT	COs
		PART A			
1	a	Explain the Routh's stability criterion for assessing the stability of a system.	7	L2	CO4
	b	A feedback control system has a characteristic equation: $S^6+2S^5+9S^4+16S^3+24S^2+32S+16=0$ How many poles are : i)In the left half of s-plane ii)On the imaginary axis iii)On the right half of the s-plane.	10	L3	CO4
	c	Explain the construction rules of root locus.	8	L2	CO4
		OR			
2	a	The state diagram of a linear system is given below. Assign state variables and obtain the state model. 	8	L3	CO4
	b	A unity feedback control system has an open loop transfer function $G(S)=\frac{K}{S(S^2+4S+13)}$ .Sketch the root locus.	12	L3	CO4
	c	State the advantages of state variable approach.	5	L2	CO4
		PART B			
3	a	Sketch Bode plot for G(s)= $KS^2/(1+0.2S)(1+0.02S)$ and determine the system gain K for the gain cross over frequency to be 5 rad/sec.	12	L3	CO4
	b	For unity feedback control system,G(s)= $\frac{K}{S(1+0.4S)(1+0.25S)}$ Find the range of values of 'K', marginal value of K and frequency of sustained oscillations.	8	L3	CO4
	c	Define state and state variables.	5	L2	CO4
		OR			
4	a	$S^6+4S^5+3S^4-16S^2-64S-48=0$ .Find the number of roots of this equation with positive real part,zero real part and negative real part.	8	L3	CO4
	b	Construct the state model of mechanical system shown in fig.	10	L3	CO4

26/8/22
Prepared by: Prabha G S

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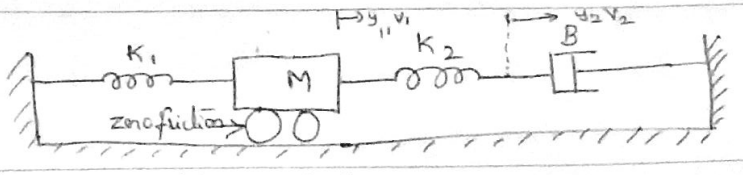

c	Obtain the state transition matrix for $A = \begin{bmatrix} 0 & -1 \\ 2 & -3 \end{bmatrix}$	7	L3	CO4