B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E.   **Semester: VI**
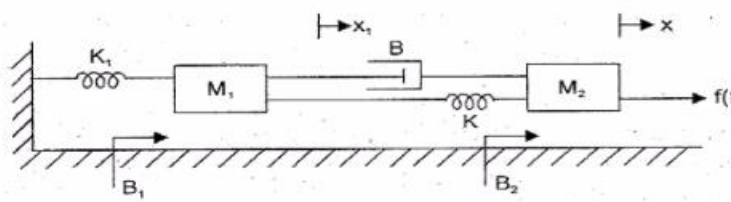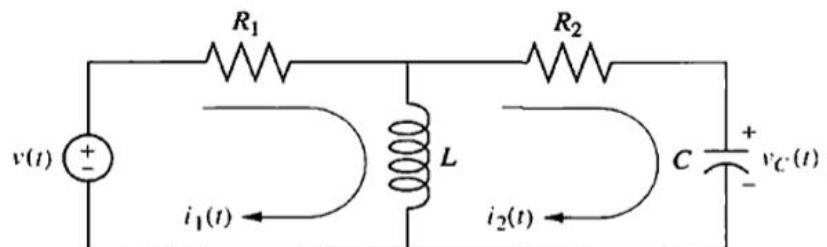
Branch: Mechanical Engineering   **Duration: 3 hrs.**

Course Code: 23ME6PCCOE / 22ME6PCCOE   **Max Marks: 100**

Course: Control Engineering

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNITB - I	CO	PO	Marks
1	a)		Compare open loop and closed loop control system with one example.	CO1	PO3	**10**
	b)		Determine the transfer function of the given mechanical system Fig 1 b	CO2	PO3	**10**
			OR			
2	a)		Determine the transfer function of the given electrical system	CO2	PO3	**10**
	b)		List and explain any 5 basic terminologies of control system	CO1	PO3	**2 * 5 = 10**
			UNIT - II			
3	a)		List and explain the types of standard test signals (inputs)	CO3	PO3	**10**
	b)		Derive an expression for the system response of first order system subjected to unit step input	CO3	PO3	**10**

			OR			
4	a)	Derive an expression for the system response of second order system subjected to unit step input		*CO3*	*PO3*	**10**
	b)	State RH Criteria and explain special case 1 and special case 2		*CO3*	*PO3*	**05**
	c)	Explain steady state errors for various types of inputs		*CO3*	*PO3*	**05**
		UNIT - III				
5		The open loop transfer function of a unity negative feedback system is given by $k/(s(s+1)(s+2))$. Draw the root locus as the value of k varies from zero to Infinity		*CO4*	*PO3*	**20**
		OR				
6		The open loop transfer function of a unity negative feedback system is given by $k(s+1)(s+2)/(s(s+3))$. Draw the root locus as the value of k varies from zero to Infinity		*CO4*	*PO3*	**20**
		UNIT - IV				
7		Bode magnitude and phase for the system with transfer function $G(S) = 200/(s^2(s+10))$ and determine the stability of the system.		*CO4*	*PO3*	**20**
		OR				
8		Determine the value of K for a unity feedback control system having open loop transfer function $G(s)H(s) = K/(s(s+2)(s+4))$. Find the value of K for gain margin 20 decibels		*CO4*	*PO3*	**20**
		UNIT - V				
9	a)	Draw the polar plot and determine gain margin for the system having transfer function $G(s)H(s) = 1/(s+1)^3$		*CO5*	*PO3*	**14**
	b)	What is Polar plot? Explain gain margin and phase margin		*CO5*	*PO3*	**06**
		OR				
10	a)	State Nyquist Stability Criteria.		*CO5*	*PO3*	**02**
	b)	A negative feedback control system is characterized by an open-loop transfer function, $G(s)H(s) = 5/(s(s+1))$. Investigate the closed-loop stability of the system using Nyquist stability criterion.		*CO5*	*PO3*	**18**

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