sRoll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – October 2025

Date: 09-10-2025 **Time:** 02.00pm to 03.30pm

School: SOE	**Program:** B.Tech	
Course Code :ECE3006	**Course Name:** Digital Control Systems	
Semester: V	**Max Marks**:50	**Weightage**:25%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	24	14	12		

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

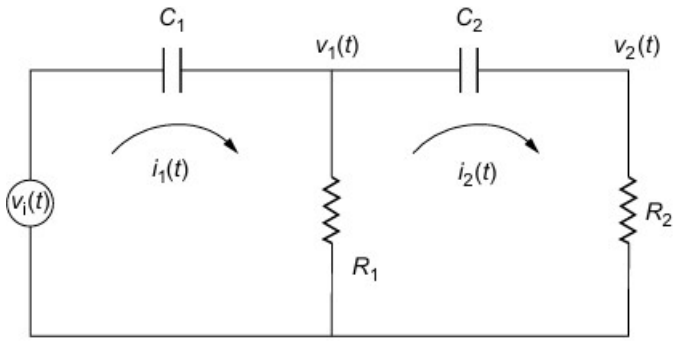
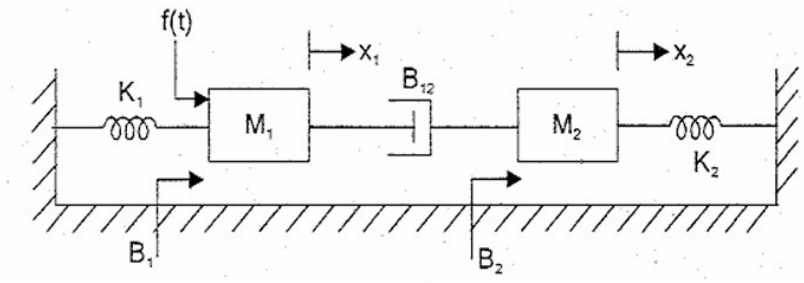
Part A

Answer ALL the Questions. Each question carries 2marks. **5Q x 2M=10M**

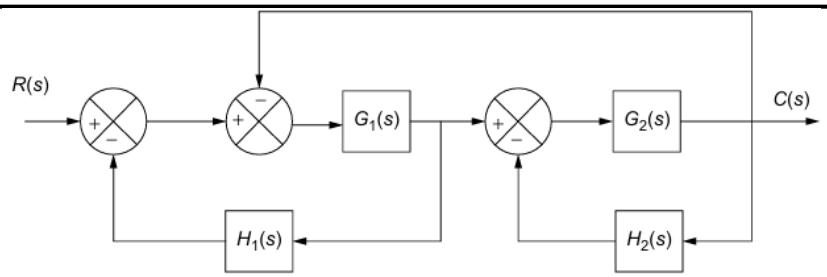
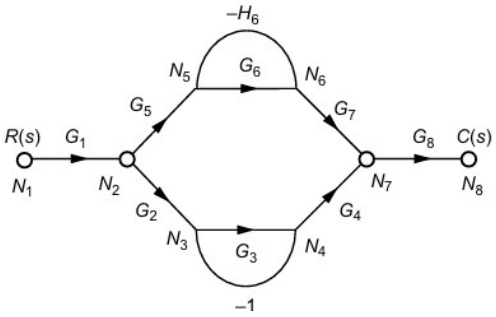
1	A negative feedback system has a forward gain of 10 and feedback gain of 1. Determine the overall gain of the system.	**2 Marks**	**L2**	**CO1**
2	What are the basic elements used for mechanical rotational system?	**2 Marks**	**L2**	**CO1**
3	How do analog control systems and digital control systems differ in terms of stability analysis	**2 Marks**	**L2**	**CO2**
4	State the pole-mapping equation used in bilinear transformation for converting an analog transfer function into a digital transfer function.	**2 Marks**	**L2**	**CO2**
5	What is the steady-state value of the step response in a first-order system?	**2 Marks**	**L2**	**CO3**

Part B

Answer the Questions. **Total Marks 40M**

6.	**a.**	Consider the linear time-invariant electrical circuit shown below: • The input is a voltage source $v_1(t)$. • The circuit consists of resistor and capacitor connected in a specified configuration given in figure • The output voltage $v_2(t)$ is measured across the designated element. For the circuit shown, write the differential equations and hence find the transfer function $\frac{V_1(s)}{V_2(s)}$?  	**10 Marks**	**L3**	**CO 1**
		Or			
7.	**a.**	Derive the transfer function for the given mechanical system  	**10 Marks**	**L3**	**CO 1**

8.	**a.**	For the block diagram of the system as shown in Fig., determine the transfer function using the block diagram reduction technique.	**10 Marks**	**L3**	**CO 1**

					
		Or			
9.	**a.**	The signal flow diagram for a particular system is shown in Fig., Determine the transfer function of the system using Mason's gain formula. 	**10 Marks**	**L3**	**CO 1**
10.	**a.**	Using Bilinear transformation, find the transfer function of the digital filter for $H(s)=\frac{5}{(S+1)(S+2)}$	**10 Marks**	**L3**	**CO 2**
		Or			
11.	**a.**	Using Bilinear transformation, find the transfer function of the digital filter for $H(s)=\frac{1}{(S^2+2S+1)}$ for T=0.1Sec.	**10 Marks**	**L3**	**CO 2**
12.	**a.**	A first-order linear time-invariant (LTI) system is described by the transfer function $H(s)=\frac{1}{\tau s+1}$ If the input applied to this system is a impulse function δ(t), determine the complete response of the system in the time domain. Discuss the physical interpretation of this response.	**10 Marks**	**L3**	**CO 3**
		Or			
13.	**a.**	A first-order linear time-invariant (LTI) system is described by	**10 Marks**	**L3**	**CO**

		the transfer function $H(s)=\frac{1}{\tau s+1}$ If the input applied to this system is a ramp function r(t), determine the complete response of the system in the time domain. Discuss the physical interpretation of this response.			**3**