Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UPES

End Semester Examination, May 2025

Program Name : B. Tech. (CERP) **Semester : VI**

Course Name : Process Dynamics Instrumentation & Control **Time : 3 hours**

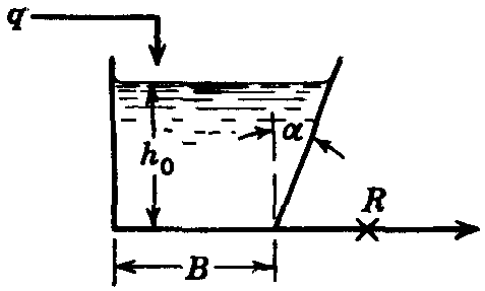
Course Code : CHCE 3007 **Max. Marks: 100**

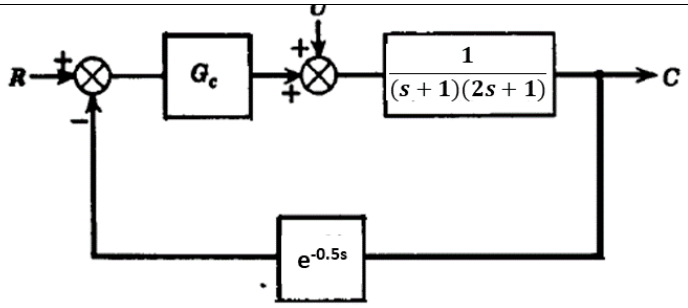
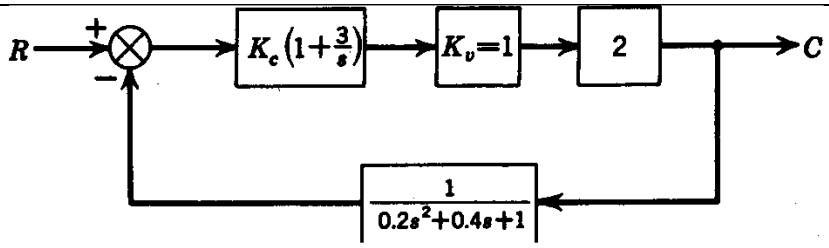
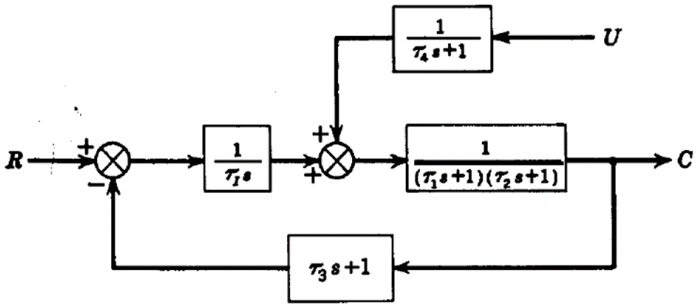
Nos. of page(s) : 02

SECTION A
(5QX4M=20 marks)

S. No.		Marks	CO
1	***Describe*** a first order system?	**4**	**CO1**
2	***Outline*** linear system in the liquid level process.	**4**	**CO1**
3	***Explain*** how the controllers are classified?	**4**	**CO2**
4	***Demonstrate*** in brief about the Bode diagrams.	**4**	**CO3**
5	***Demonstrate*** the use of advanced control systems in the industry.	**4**	**CO3**

SECTION B
(4QX10M=40 marks)

6	***Identify*** the following differential equations using Laplace Transforms. $\frac{d^2x}{dt^2} + 9x = cos2t \qquad x(0) = 1 \; and \; x'(0) = A$	**10**	**CO1**
7	***Predict*** a formula for finding the time constant of the liquid-level system shown below, when the average operating level is h,. The resistance R is linear. The tank has three vertical walls and one which slopes at an angle α from the vertical as shown in figure. The distance separating the parallel walls is 1. 	**10**	**CO2**
8	Without plotting the bode diagram for the following control loop, ***interpret*** the tuning parameters for PID controller using Ziegler and Nichols control settings.	**10**	**CO3**

			
9	 Given the control diagram shown in the above figure, by means of the Routh criterion ***compose*** those values of Kc for which the output C is stable for all inputs of R. Find the roots when the system is on the verge of instability.	**10**	**CO4**
	SECTION C **(2Q X 20M=40 marks)**		
10	Given the control diagram shown below, ***Calculate*** by means of the Routh criterion those values of τ_I for which the output C is stable for all inputs R and U. 	**20**	**CO4**
11	***Construct*** the root locus for the open loop transfer function. $$\frac{K(s+3)}{s(s+1)(s+2)(s+4)}$$ **OR** With neat diagrams and appropriate process and block diagrams ***explain*** a) Feed forward control system b) Cascade control system	**20**	**CO5**