



VIT

Vellore Institute of Technology

REG.NO.:

SCHOOL OF CHEMICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST -II
FALL SEMESTER 2025-2026

SLOT: D1+TD1

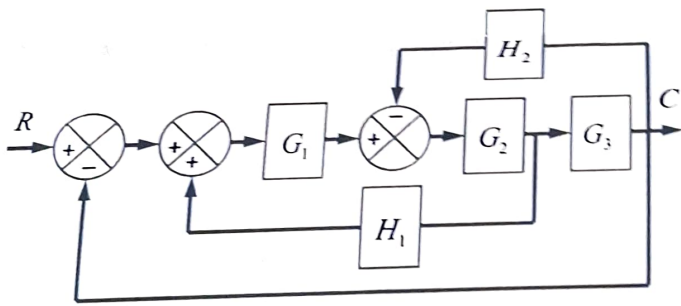
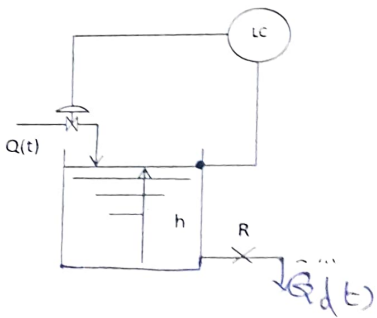
Programme Name & Branch : B.Tech (Chemical Engineering)
 Course Code : BCHE305L
 Course Name : Process Dynamics and Control
 Faculty Name(s) : Dr. A. Babu Ponnusami
 Class Number(s) : VL2025260101248
 Date of Examination : 08-10-25
 Exam Duration : 90 minutes
 Maximum Marks: 50

General instruction(s): Ordinary graph sheet to be provided.

M - Max mark: CO - Course Outcome: BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)

Course Outcomes: CO3- Identify the modes of control action required for closed loop control system and its stability in time domain.

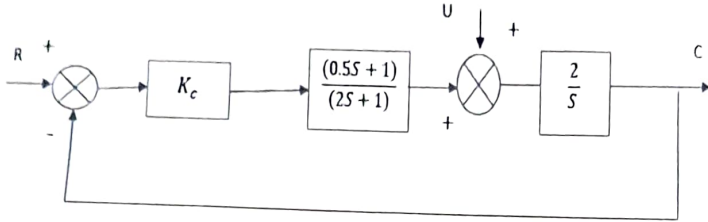
Answer all the Questions (5 x 10 = 50 Marks)

S.No	Question	M	Course Outcome	BL
1	Obtain the transfer function for the following block diagram using block diagram reduction techniques 	10	CO3	3
2	Consider the liquid level control system shown in fig. The following information is known: - Resistance 'R' is linear. - Cross-sectional area of tank is 'A' m². - There is no dynamic lag in the valve and in the measuring element. - Proportional controller is used to control level inside the tank. Draw a block diagram of this control system, and in each block give the transfer function. Also, derive the offset value for unit step change in set point and in $Q_0(t)$. 	10	CO3	3



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3	For the control system shown in fig, Find (i) The closed loop transfer function C/U and C/R (4) (ii) The offset for a unit step change in Load variable, if $K_c = 2$ (3) (iii) The offset for a unit step change in Setpoint variable, if $K_c = 2$ (3) 	10	CO3	4
4	(i) A PID controller is at steady state with an output pressure of 9 psi. The set point and pen point are initially together. At time $t=0$, the set point is moved away from the pen point at a rate of 0.5 inch/min. If the knob settings are $K_c = 2$ psi/inch, $\tau_i = 1.25$ min and $\tau_D = 0.4$ min. Plot the output pressure versus time. (ii) Under what circumstances proportional controller is consider as ON/OFF controller. A pneumatic proportional controller is used to control temperature within the range of 60°F to 110°F. The controller is adjusted so that the input pressure goes from 3 psi (fully open) to 15 psi (fully closed). Measured temperature goes from $76-80^\circ\text{F}$ with set point set as constant. Calculate the gain and proportional band.	10	CO3	3
5	Find the stability of the system using Routh array test having characteristics equation of $s^7 + 5s^6 + 9s^5 + 9s^4 + 4s^3 + 20s^2 + 36s + 36 = 0$ and comment on the position of the roots.	10	CO3	4

-----ALL THE BEST-----