



PRESIDENCY UNIVERSITY

BENGALURU

Roll No.																			
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Make up Examinations – December 2025

Date: 31 – 12- 2025 **Time:** 09:30am – 12:30pm

School: SOE	Program: B. Tech in Petroleum Engineering	
Course Code: PET226	Course Name: Process Control and Instrumentation	
Semester: MK	Max Marks: 100	Weightage: 50%

CO - Levels	C01	C02	C03	C04	C05
Marks	22	26	52	-	-

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

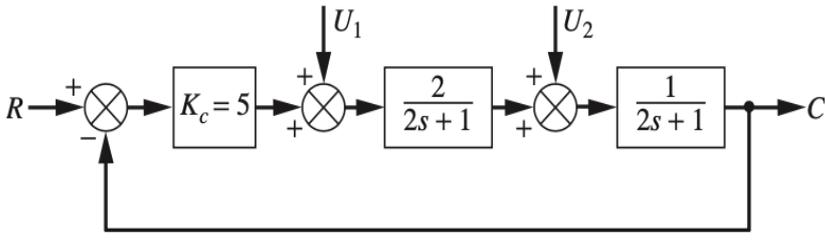
Part A

Answer ALL the Questions. Each question carries 2 marks. 10Q x 2M=20M

1	With the help of block diagram list two difference between feedback and cascade control system.	2 Marks	L1	C03
2	Recall transportation lag.	2 Marks	L1	C02
3	In the below figure, G(s) represents the first order transfer function of this control system. Reproduce the overall transfer function for the given control system.	2 Marks	L1	C03

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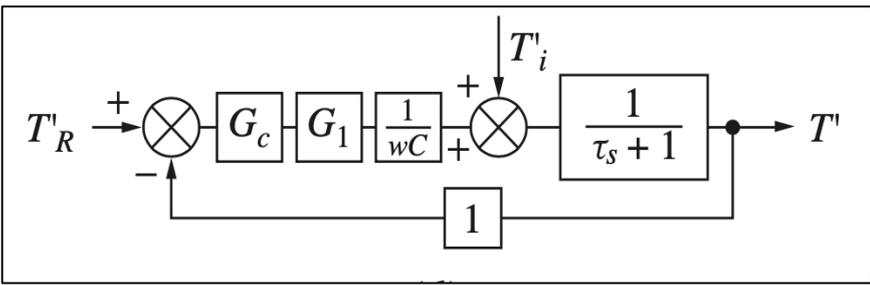
graph LR
    Xs["X(s)"] --> Gs["G(s)"]
    Gs --> Ys["Y(s)"]
  
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4	Outline the diagram of a unity-feedback system and its key components.	2 Marks	L1	CO3
5	Outline a cascade control system very clearly, taking the key components suitably and find the overall transfer function of the system.	2 Marks	L1	CO3
6	 <p>State the transfer function of the closed loop system as shown above while considering regulator problem (consider load U_1 only).</p>	2 Marks	L1	CO3
7	Reproduce the Laplace transform when $f(t) = 1$. [Follow all steps]	2 Marks	L1	CO3
8	Tell the Control valve first-order transfer function. [Mention the key components clearly]	2 Marks	L1	CO 2
9	Reproduce the Laplace transform of a function $f(t) = e^{-t}$ [Follow all steps]	2 Marks	L1	CO2
10	Consider two tank is connected by non-interacting position. Recall the overall transfer function of the system. [Draw the diagram if required]	2 Marks	L1	CO1

Part B

Answer the Questions

Total 80 Marks.

11.	<p>Apply the concepts of proportional control to develop the relationship for offset in a heated stirred-tank reactor, considering both the servo and regulator problems.</p> 	20 Marks	L3	CO3
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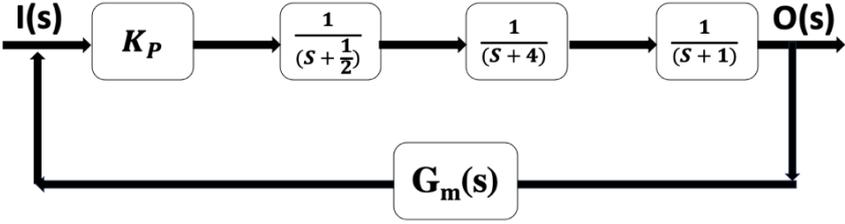
[Do not skip any step]

or

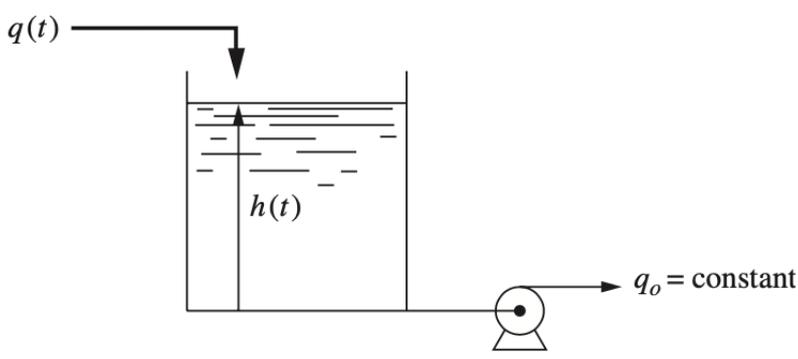
12.	Given a closed-loop control system with arbitrarily chosen components, sketch the block diagram and apply control system principles to determine the overall transfer function of the system	20 Marks	L3	C03
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13.	Given two first-order tanks connected in an open-loop configuration, derive and apply the relevant system equations to obtain the overall transfer function of the combined system.	20 Marks	L3	C03
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Or

14.	<p>Apply appropriate control system analysis methods to compute the overall transfer function of the closed-loop system shown in the figure.</p> 	20 Marks	L3	C03
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15.	<p>a. Consider, you have a stirred tank reactor which is controlled by a closed loop system. The reactor temperature was maintained at a constant temperature. In that system the feed forward path transfer function is given by $\frac{K_G}{\tau_P s + 1.5}$. The feedback transfer function is given by 1. After some times the reactor temperature was changed to a certain level by introducing unit impulse into the system. Solve the output response of the given system.</p> <p>[First draw the control system as per question and consider the input and output symbol of the system is P(s) and Q(s), respectively]</p>	20 Marks	L3	C02
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b.	 <p>Examine the transfer function for the given system, as shown above.</p>		L3	C02
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Or

16.	a.	10 Marks	L3	C02
	b.	10 Marks	L3	C02

17.	a.	10 Marks	L3	C01
	b.	10 Marks	L3	C01

Or

18.	a.	10 Marks	L3	C01
	b.	10 Marks	L3	C01

The unit step impulse is introduced into the open loop system which is shown in below figure. Solve the output $x(t)$ from the below system. **[Do not skip any steps]**

