Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – October 2025

Date: 09-10-2025 **Time:** 09.30am to 11.00am

School: SOE	**Program:** B.Tech. (PET)	
Course Code: PET2005	**Course Name:** Fundamentals of Instrumentation and Control Engineering	
Semester: V	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Marks	**14**	**12**	**14**	**10**	**-**	**-**

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. **5Q x 2M=10M**

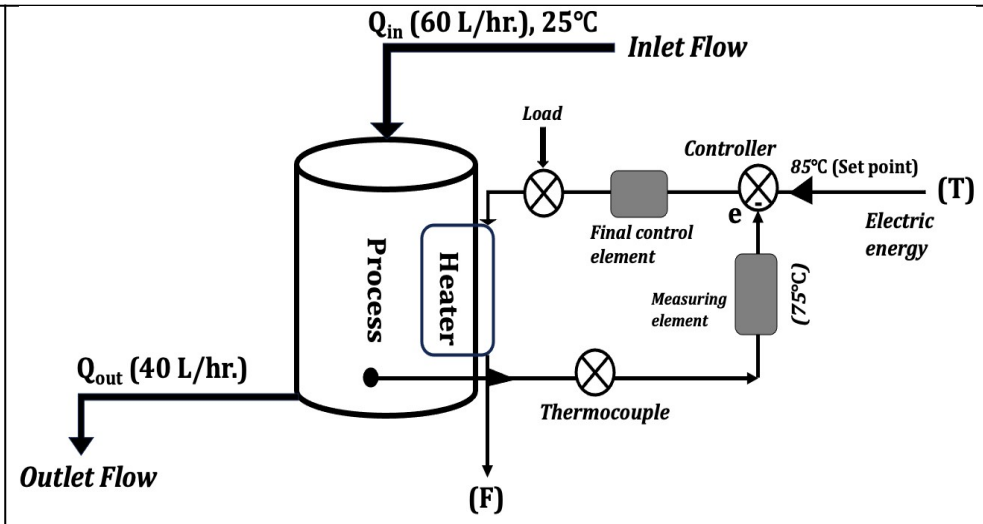
1	Differentiate between feedback control system and cascade control system (4 points only).	**2 Marks**	**L2**	**CO1**
2	Explain the purposes of a measuring element in a control system.	**2 Marks**	**L2**	**CO1**
3	Describe the transfer function of the transportation lag.	**2 Marks**	**L2**	**CO2**
4	Summarize the transfer function for a single tank liquid system (only write the characteristic equation).	**2 Marks**	**L2**	**CO3**
5	Summarize the transfer function for a two-tank interacting system (only write the characteristic equation).	**2 Marks**	**L2**	**CO3**

Part B

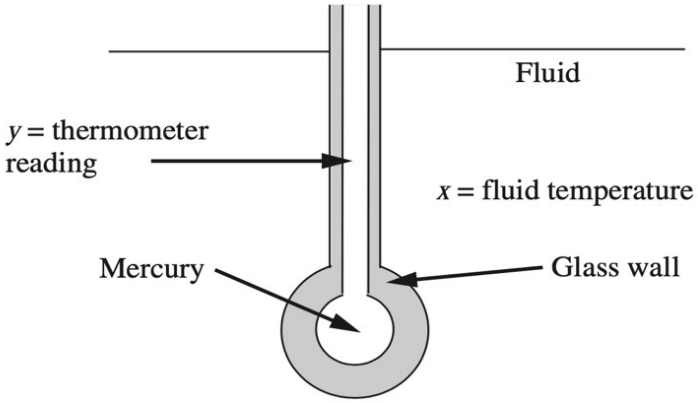
Answer the Questions. **Total Marks 40M**

6.	Consider you have five different types of system with you like timed washing machine, Basic flow or level control in a tank system, maintaining liquid level in a tank where flow rate changes, Temperature control in an oven or chemical reactor, and adjusting the fuel feed in a combustion process based on changes in load demand. For each case take suitable control system and summarize them.	**10 Marks**	**L2**	**CO1**
	Or			
7.	In one room, a washing machine runs without a regulator (Case 1). In another room, a washing machine runs with an automatic controller that adjusts speed by comparing actual speed with the set point (Case 2). (a) Illustrate both the process with flow diagram. (b) Examine the transfer function for both the system.	**5+5 Marks**	**L3**	**CO1**

8.	"Examine the working of a cascade control system by breaking down its structure with the help of a suitable diagram and example." (Clearly sketch the diagram)	**5+5 Marks**	**L4**	**CO2**
	Or			
9.	The figure is shown below represents a reactor heating process in a petroleum refinery industry. The inlet and outlet feed rate of the process is 60 and 40 L/hr., respectively. The process needs 70°C to get a desired product. Suppose, you set a heater inside the tank (see figure) by applying electric energy and fixed the set point at 85°C by using a controller. After some time, the inside tank temperature was found at 75°C from the measuring element (as shown in figure below). **Some standard symbols for the variables as given below:** Set point: T Load: U Transfer function of controller: G_c Transfer function of final control element: G_1 Transfer function of process: G_2 Transfer function of measuring element: F (a) Identify the process with block diagram according the figure. (b) From the loop system calculate the "error (e)" of this process.	**5+5 Marks**	**L4**	**CO2**

10.	"Apply the concept of control systems to sketch a single-tank liquid-level system with constant flow rate and determine its transfer function."	**2+8 Marks**	**L3**	**CO3**
	Or			
11.	Examine the overall transfer function for two-tank non-interacting system with a suitable diagram.	**8+2 Marks**	**L3**	**CO3**

12.	 The above figure shows an **unsteady-state** mercury glass thermometer system. Examine the transfer function of the above system.	**10 Marks**	**L4**	**CO4**
	Or			
13.	Examine the overall transfer function for two-tank interacting system with a suitable diagram. (Do not skip any step)	**8+2 Marks**	**L4**	**CO4**