Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V EXAMINATION – WINTER 2015

Subject Code: 151402 **Date:08/12/2015**

Subject Name: Food Process Instrumentation and Control

Time: 10:30am to 1:00pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

1Q **a** Write short notes on followings; **07**

1. Significance of specific gravity measurement.
2. Different types of flow.
3. First order systems.
4. Partially immersed thermometer
5. Death space

b **07**

1. What is the mathematical structure of a 1st order system transfer function?
2. What is the minimum voltage measured by eight bit A/D converter with 7 volt input?
3. Explain sensitivity drift with example.
4. Explain positive feedback control in detail

2Q **a** Discuss the See Beck and Peltier effect. Explain the laws of thermocouple with diagram. **07**

b Discuss the working of following instrument; **07**

1. Vapour pressure thermometer
2. Constant volume thermometer
3. Mercury in steel thermemeter

OR

b Describe in brief about bode diagram.

3Q **a** Draw and explain feed forward control loop with example. **07**

b Differentiate between magnetic and target flow meter with diagram. **07**

OR

3Q **a** Differentiate between turbidity and colour as an instrumentation point of view? What are the instruments used for the measurement of turbidity also provide the list of wavelength for different colour. **07**

b Discuss the followings with diagram; **07**

1. Efflux viscometer
2. Rotameter type viscometer

4Q	**a**	Define Laplace transforms and derive relation between flow rate and height of liquid in a tank for Level in a tank system	**07**
	b	Find Laplace transform of the function y(t) that satisfies the differential equation and initial conditions $$\frac{dy}{dt} - 3y = 0 \quad with \quad y(0) = 4$$	**07**

OR

4Q	**a**	Derive Laplace transform for the following functions 1. Exponential 2. sine 3. step	**07**
	b	What do you understand by direct and indirect method of liquid level measurement? Discuss float gauge and purge method in detail with diagram.	**07**
5Q	**a**	A McLeod gauge has volume of bulb, capillary and tube down to its opening equal to 95cm^3 and a capillary diameter of 1.5mm. Calculate the pressure indicated by a reading of 5cm.	**07**
	b	Discuss resistance strain gauge. Show with diagram about balance and unbalance bridge.	**07**

OR

	a	Develop the transfer function for unsteady state & ordinary mercury in glass thermometer.	**07**
	b	Define Resolution, State variables, Hysteresis, Death space, Span, Analog signals and Precision	**07**