Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V- EXAMINATION – SUMMER 2016

Subject Code: 150504 **Date: 06/05/2016**

Subject Name: Instrumentation & Process Control

Time: 02:30 PM to 05:00 PM **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	**Derive transfer function for first order Mercury in glass thermometer. Mention the assumption of the system.**	**07**
	(b)	**Derive transfer function of Mixing process for a first order system.**	**07**
Q.2	**(a)**	**Derive equations of Unit steps for critically damped second order system.**	**07**
	(b)	**Derive Transfer function for PD and PID controller.**	**07**
		OR	
	(b)	**Define the following terms :** **(i) Overshoot (ii) Decay Ratio (iii) Response time (iv) Rise time** **(v) Proportional width (vi) Time constant (vii) Period of Oscillation.**	**07**
Q.3	**(a)**	**Describe the mechanism of control valve with neat sketch.**	**07**
	(b)	**Explain Difference between :** **(i) Positive feedback and Negative feed back** **(ii) Servo mechanism and Regulator mechanism**	**07**
		OR	
Q.3	**(a)**	**Give the Characteristic equation.** $S^3 + 9S^2 + 26S + (24 + 48\ K_c) = 0$ **Determine the value of K_c for which the system is stable by Routh Array method.**	**07**
	(b)	**What are the bode Diagram? Explain the graphical rules for Bode diagram.**	**07**
Q.4	**(a)**	**Explain principle and working of Venturimeter**	**07**
	(b)	**Write a short note on Area flow meter.**	**07**
		OR	
Q.4	**(a)**	**Explain working of Bimetallic thermometer and Optical pyrometer.**	**07**
	(b)	**Explain dynamic Characteristics of an instrument.**	**07**
Q.5	**(a)**	**Mention the various temp. measured devices and explain the temp. measurement by thermocouple.**	**07**
	(b)	**Explain Pressure spring thermometer.**	**07**
		OR	
Q.5	**(a)**	**Write a short note on Radiation Pyrometer.**	**07**
	(b)	**Write a short note on viscosity measurement.**	**07**

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