Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. Sem. - V - Examination – June- 2011

Subject code: 150504

Subject Name: Instrumentation and Process Control

Date:27/06/2011 **Time: 10:30 am – 01:00 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)** Define the following terms: **07**

(i) overshoot
(ii) decay ratio
(iii) response time
(iv) proportional band
(v) rise time
(vi) time constant
(vii) steady state gain

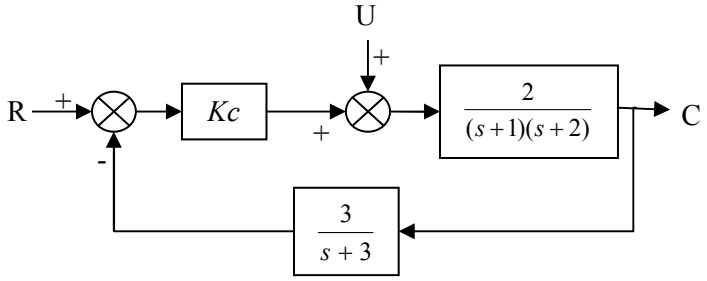
(b) Derive the transfer function for mercury thermometer. List out the assumptions and justify them. **07**

Q.2 **(a)** Explain Accuracy, Reproducibility and sensitivity for instruments. **06**

(b) What do you understand by stability of a control system? Briefly explain Nyquist stability criteria. **08**

OR

(b) Determine the value of Kc for which the under given control system is stable. **08**



Q.3 **(a)** Determine the linearized transfer function between the height of liquid in the tank and flow rate of liquid from the tank for the liquid level system with non-linear resistance. **07**

(b) Prove that the effect of feedback is to speed up the response of the control. **07**

OR

Q.3 **(a)** Prove that the addition of integral mode of control to proportional mode of control eliminates off-set. **07**

(b) Briefly describe pneumatic controller mechanism of proportional control and PI Control. **07**

Q.4 **(a)** For two interacting first order liquid level systems derive the transfer function. Show the effect at outlet flow rate from second tank to step and pulse input disturbance in flow to the first tank. **08**

	(b)	Discuss cross ambient effect in various thermometers and suggest suitable methods to overcome this effect.	**06**

OR

Q.4	**(a)**	What is the order of the U-tube mercury manometer system? Derive the transfer function for U-tube mercury manometer. List out the assumptions made in deriving the transfer function.	**08**
	(b)	Briefly describe types of industrial thermocouples and the factors influencing the speed response of thermocouples.	**06**
Q.5	**(a)**	Explain the working of bimetallic thermometer and optical pyrometer.	**08**
	(b)	Briefly describe the working of any two types of instruments used for measuring vacuum.	**06**

OR

Q.5	**(a)**	List out pressure measurement devices with special feature, merits and demerits of each.	**08**
	(b)	Explain working of the differential pressure meter. Highlight its special features comparing with other instruments used for same application.	**06**

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