Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2182604 Date:17/05/2019

Subject Name:Automation & control in Rubber Industries

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Draw figures wherever necessary**
4. **Figures to the right indicates full marks.**

Q.1	**(a)**	Define the given terms:(i) Dead Zone (ii) Drift (iii) Dynamic Error	**3**
	(b)	Explain the classification of instrument according to it's function.	**4**
	(c)	Discuss in detail about circular chart recorder. Which process variables of rubber industries are recorded by it?	**7**
Q.2	**(a)**	Which characteristic features would be included in rubber extruder instrumentation?	**3**
	(b)	List different types of sensors used to carry out the temperature measurement in rubber extruder. Write on any two.	**4**
	(c)	Write down the different types of sensors used to carry out the gauge measurement in rubber calendering process. Write on any two.	**7**
		OR	
Q.2	**(c)**	Give the principle sources of variations in calendered gauge. Discuss any one.	**7**
Q.3	**(a)**	Give examples of industrial thermocouples used in rubber industries.	**3**
	(b)	List various types of elastic pressure transducer. Write on any one.	**4**
	(c)	Discuss in detail about construction and working of strain gauge load cell.	**7**
		OR	
Q.3	**(a)**	Draw various configurations of thermistors.	**3**
	(b)	Explain any one method to carry out pressure measurement under vacuum.	**4**
	(c)	Discuss in detail about the construction and working of in-line stationary torque transducer.	7
Q.4	**(a)**	List out the terms which are used in controlled configurations.	**3**
	(b)	Define the term 'time constant'. A mercury thermometer of first order characteristics take 5 seconds to indicate 70% of final temperature. Calculate time constant of thermometer.	**4**
	(c)	Which softwares are used in data acquisition and analysis in rubber industries? Write in brief on any two.	**7**
		OR	
Q.4	**(a)**	Write in brief on comparator.	**3**
	(b)	A mercury thermometer of first order characteristics having time constant of 4.5 seconds. Calculate the time needed to indicate 75% of the final temperature.	**4**
	(c)	Discuss about the errors in data acquisition and analysis in rubber industries.	**7**

Q.5	**(a)**	Give the advantages of pneumatic controller.	**3**
Q.5	**(b)**	Explain the servo problem with suitable example.	**4**
Q.5	**(c)**	A unit step change in error is introduced into a PID controller. If K_c=10, τ_I=1 and τ_D=0.5, plot the response of controller against time.	**7**

OR

	(a)	Write a brief note on transmission lines.	**3**
Q.5	**(b)**	Explain the regulatory problem with suitable example.	**4**
Q.5	**(c)**	A PID controller is at steady state with an ouput pressure of 10Psi. The set point and pen pint are initially together. At time t=0, the set point is removed away form the pen point at rate of 0.5inch/minute. The motion of the set point is in the direction of lower readings. If the knob settings are K_c=2Psi/inch of pen travel, τ_I=1.5 mins, and τ_D=0.5. Plot the graph of output pressure vs. time	**7**