Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII • EXAMINATION – WINTER • 2014

Subject code: 182604 **Date: 29-11-2014**

Subject Name: Automation and Control in Rubber Industries

Time: 02:30 pm - 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)**	Discuss in detail about the characteristics of an instrument.	**07**
Q.1	**(b)**	Answer the following	
	i	Which functions are fulfilled by an instrument?	**04**
	ii	Write down the purpose of an instrumentation diagram.	**03**
Q.2	**(a)**	Discuss in detail about the two level factorial experimental design for designing processing trials of rubber industries.	**07**
Q.2	**(b)**	Answer the following	
	i	Write down a short note on product specification.	**04**
	ii	List out the major components of computer process monitoring system.	**03**
		OR	
Q.2	**(b)**	Answer the following	
	i	Write down a short note on material specification.	**04**
	ii	Which main advantages are gained by using computer process monitoring?	**03**
Q.3	**(a)**	Explain the construction and working of Linear Variable Differential Transducer (LVDT).	**07**
Q.3	**(b)**	Answer the following	
	i	Write down the advantages of on calender measurement.	**04**
	ii	Write a brief note on thermal well.	**03**
		OR	
Q.3	**(a)**	List the different types of torque sensors used in rubber industry. Discuss any one in detail.	**07**
Q.3	**(b)**	Answer the following	
	i	Write down the advantages and disadvantages of post calendered measurement.	**04**
	ii	List out the most commonly used thermocouples in rubber industries.	**03**
Q.4	**(a)**	Derive the transfer function of control valve.	**07**
Q.4	**(b)**	Answer the following	
	i	Explain the servo problem and regulatory problem respectively.	**04**
	ii	Define the given terms: (i) Measuring Element (ii) Comparing Element (iii) Deviation	**03**

OR

Q.4	**(a)**	With necessary assumptions, derive the transfer function representing dynamic behavior of mercury in the glass thermometer.	**07**
Q.4	**(b)**	Answer the following	
	i	Explain the open loop control and close loop control respectively.	**04**
	ii	Define the following terms: (i) Desired Value (ii) Set Value (iii) Offset	**03**
Q.5	**(a)**	How data acquisition in rubber industry is carried out by using menu drive software.	**06**
Q.5	**(b)**	Answer the following	
	i	Compare pneumatic controller with electronic controller.	**04**
	ii	In a PID controller the error is increased linearly at the rate 5°C/minute. The proportional sensitivity of PID controller is 5, integral time is 2 and derivative time is 0.6. Obtain the response equation of controller.	**04**

OR

Q.5	**(a)**	How data acquisition in rubber industry is carried out by turnkey software?	**06**
Q.5	**(b)**	Answer the following	
	i	Derive a transfer function of PID controller.	**04**
	ii	A step change of magnitude 4 is introduced into PI-controller. If the valued of k_c is 6 and integral time is 2, plot the response of the controller.	**04**

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