Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – WINTER • 2014

Subject code: 162604 **Date: 05-12-2014**

Subject Name: Characterization of Rubber

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 the confirmatory test for Styrene Butadiene Rubber (SBR) and Chloroprene Rubber (CR) respectively.	**07**
Q.1	**(b)**	Answer the following	
	i	Outline the methods of test specimen preparation for characterization of rubber.	**04**
	ii	Write down the full forms of given terms:(i) IEC (ii) DIN (iii) ANSI	**03**
Q.2	**(a)**	Discuss applications of various microscopic techniques in characterization of rubber and related materials.	**07**
Q.2	**(b)**	Answer the following	
	i	Explain in brief about the method used to determine unutilized sulphur present in rubber vulcanizate.	**05**
	ii	Which characteristic properties of rubber can be determined by using Small Angle X-ray Scattering?	**02**
		OR	
Q.2	**(b)**	Answer the following	
	i	How an extraction analysis of vulcanizate is carried out? What is practical significance of this?	**05**
	ii	Write down major difference between Small Angle X-ray Scattering and Wide Angle X-ray Scattering.	**02**
Q.3	**(a)**	Discuss in detail about construction and working of Thermogravimetry Analysis (TGA) apparatus.	**07**
Q.3	**(b)**	Answer the following	
	i	Explain the stress-strain behavior of purely elastic material when it is subjected to sinusoidal oscillation.	**04**
	ii	Draw labeled diagrams of various types of sample holders used in Thermogravimetric Analysis (TGA).	**03**
		OR	
Q.3	**(a)**	What do you mean by Thermogram? Explain Differential Scanning Calorimetry (DSC) thermogram of semi crystalline polymer.	**07**
Q.3	**(b)**	Answer the following	
	i	Which methods are used to express output of Thermogravimetric Analysis (TGA)? Explain any one.	**04**
	ii	Define the given terms: (i) Storage Modulus (ii) Loss Modulus (iii) Complex Modulus	**03**

Q.4	**(a)**	Discuss in detail about Gel Permeation Chromatography.	**07**
Q.4	**(b)**	Answer the following	
	i	Explain the solvent delivery system used in High Pressure Liquid Chromatography.	**04**
	ii	Write a brief note on adsorption chromatography.	**03**
		OR	
Q.4	**(a)**	Discuss in detail about Thin Layer Chromatography (TLC).	**07**
Q.4	**(b)**	Answer the following	
	i	Why High Pressure Liquid Chromatography (HPLC) in some respects proved to be more versatile than Gas Chromatography (GC)?	**04**
	ii	Write a brief note on partition chromatography.	**03**
Q.5	**(a)**	Discuss various types of transition takes place during ultraviolet spectrometry.	**07**
Q.5	**(b)**	Answer the following	
	i	Give the types of molecular spectra. How they are represented?	**05**
	ii	What do you mean by nucleating agent?	**02**
		OR	
Q.5	**(a)**	Explain the filed application of Infra Red (IR) spectroscopy for the pyrolyzates and films of Isoprene Rubber, Polychloroprene Rubber and Nitrile Rubber.	**07**
Q.5	**(b)**	Answer the following	
	i	Write a short note on interferometer.	**04**
	ii	Give an importance of fractional precipitation technique.	**03**

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