Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 714001N **Date: 08-01-2013**

Subject Name: The Physics of Rubber Elasticity

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)**	Explain about the Kinetic theory of elasticity.	**(07)**
	(b)	Discuss in detail about The glass-rubber transition phase.	**(07)**
Q.2	**(a)**	Describe about the Thermal effects of extension.	**(07)**
	(b)	Establish the stress-temperature relations for understanding the internal energy & entropy changes on deformation.	**(07)**
		OR	
	(b)	Write about the Chemical constitution of rubbers.	**(07)**
Q.3	**(a)**	Determine the number of links and the length of the link for equivalent random chain.	**(08)**
	(b)	List the significant properties of Gaussian network related to junction points.	**(06)**
		OR	
Q.3	**(a)**	Write in detail about the elastic properties of a swollen rubber.	**(07)**
	(b)	Discuss the statistical properties of randomly jointed chain.	**(07)**
Q.4		List the different types of Strain. Establish and explain the Particular Stress-Strain relations.	**(14)**
		OR	
Q.4	**(a)**	Explain about the direct method developed by Flory & co-workers for the estimation of the degree of cross linking.	**(05)**
	(b)	Derive the equation for Calculation of entropy of deformation & work of deformation for a molecular chain.	**(09)**
Q.5		Discuss in detail about the Statistical treatment of swelling.	**(14)**
		OR	
Q.5		Establish the relation between swelling & modulus and explain in detail.	**(14)**

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