Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 714001 **Date: 23-12-2013**

Subject Name: The Physics of Rubber Elasticity

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)**	"Rubber–like elasticity as a phenomenon associated with the rubber-like state of matter." Justify the statement with example.	**(07)**
	(b)	Short note on Crystallization in raw rubber.	**(07)**
Q.2	**(a)**	Explain the relations between stress strain in terms of simple extension and Uniaxial compression of rubber cube.	**(07)**
	(b)	Derive the relationship between force, length and temperatures also for entropy, internal energy, and thermodynamic quantities for thermodynamic analysis in rubber deformation.	**(07)**
		OR	
	(b)	How thermal effects affect on chain extension? Describe in detail.	**(07)**
Q.3	**(a)**	Explain in brief about Statistical form of Long-chain molecule.	**(07)**
	(b)	Describe in detail about the properties of Gaussian functions.	**(07)**
		OR	
Q.3	**(a)**	Discuss the statistical properties of randomly jointed chain.	**(07)**
	(b)	Write in detail about the Tension on a chain and also explain the entropy of a single chain.	**(07)**
Q.4		List the fundamental assumptions used in development of Kuhn theory. Explain the equation for calculation of entropy of deformation.	**(14)**
		OR	
Q.4	**(a)**	Discuss in detail about The principal stresses.	**(07)**
	(b)	Short note on Swelling of cross-linked polymers.	**(07)**
Q.5	**(a)**	Write the significance of swelling resistance and cross linked density. Explain the florry-rehner equation for these relationships.	**(08)**
	(b)	Write short note on Diazo compounds as crosslinking agents.	**(06)**
		OR	
Q.5	**(a)**	Explain the cohesive energy density and solubility parameter.	**(07)**
	(b)	Explain the effect of entanglements in crosslinking and modulus of elastomeric chains.	**(07)**
