

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
ME- SEMESTER II- EXAMINATION – SUMMER 2015

Subject Code: 2724008

Date: 01/06/2015

Subject Name: Physics of Rubber Elasticity

Time: 2:30 PM – 5:00 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 the Cross-linking and Vulcanisation: Network theory. (07)
- (b) Give the difference between crystallization in raw rubber and crystallization in stretched state. (07)
- Q. 2 (a) Derive the relationship between the tensile force, length of specimen & Helmholtz free energy. (09)
- Q. 2 (b) Write the difference between the elastic properties of Swollen rubber and Dry rubber. (05)
- OR
- (b) Describe the significance of thermodynamic quantities for swelling phenomena. (05)
- Q. 3 (a) Short note on: Randomly jointed chain (07)
- (b) Write fundamental assumptions for development of the molecular network theory. (07)
- OR
- Q. 3 (a) Explain the statistical form of long chain molecule with suitable model. (07)
- (b) Describe the significant properties of Gaussian network. (07)
- Q. 4 Discuss in detail about general equations for swelling depends on strain. (14)
- OR
- Q. 4 (a) Define the term Cohesive energy density and explain it in detail. (07)
- (b) Explain about swelling phenomena of cross-linked polymers. (07)
- Q. 5 Discuss in detail about the stress-strain relations from statistical theory in terms of Simple extension, Uniaxial compression and Inflation. (14)
- OR
- Q. 5 (a) Why Diazo compounds work as cross-linking agents? Explain it with example. (07)
- (b) Explain the effect of entanglements in cross-linking and modulus (07)