GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2020
Subject Code:3132606   **Date:09/03/2021**
Subject Name: Numerical methods & Viscoelastic models of Elastomers
Time:10:30 AM TO 12:30 PM   **Total Marks:56**
Instructions:
1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			Marks
Q.1	(a)	"Steel has higher elasticity than rubber" Justify the statement.	03
	(b)	Write a brief note on Longitudinal Strain.	04
	(c)	A concrete has a height of 5 meters and has unit area of 3 m^2 supports a mass of 30,000 kg. Determine (a) The stress; (b) The strain; (c) The change in height. Acceleration (g) = 10 m/s^2. Young's modulus of concrete = 20×10^9 N/m^2	07
Q.2	(a)	Give the important properties of Entropy.	03
	(b)	Explain in brief about structure of an Ideal Rubber.	04
	(c)	Discuss in detail about theory of Entropy Elasticity.	07
Q.3	(a)	Give the difference between Newtonian and Non Newtonian Fluid.	03
	(b)	Define the term Viscosity and Explain in brief about Viscosity Nomenclature.	04
	(c)	Discuss in detail about Time Dependent and Time Independent fluid.	07
Q.4	(a)	Define the Terms: (i) Kinematic Viscosity (ii) Dynamic Viscosity (iii) Shear Viscosity	03
	(b)	Explain the brief note on Bingham Plastic Fluid.	04
	(c)	Discuss in detail about theory of Viscosity.	07
Q.5	(a)	Define the terms: (i)Toughness (ii)Brittleness (iii) Ductility	03
	(b)	Write a brief note on Hooke's Model.	04
	(c)	A polystyrene sample of 0.02/m^2 cross-sectional area is subjected to a creep load of 10^5 N. The load is removed after 30 s. assuming that the Maxwell element accurately describes the behavior of polystyrene and that viscosity is 5×10^{10} P, while Young's modulus is 5×10^5 psi, calculate: (a) The compliance, (b) The deformation recovered on the removal of the dead load & (c) The permanent.	07
Q.6	(a)	Write the difference between Relaxation and Retardation.	03
	(b)	Give the broad classification of Polymeric materials based on mechanical behavior.	04
	(c)	Derive the equation for creep relaxation experiment for Voight Model.	07
Q.7	(a)	Give the difference between Crystalline and Amorphous material.	03
	(b)	What is the Tg of butadiene-Nitrile copolymer containing 30 volume nitrile?	04
	(c)	List out the factors affecting Glass transition temperature and Explain any four in detail.	07

Q.8 **(a)** Write the three major observation from phase state of substance. **03**

(b) Give the important of states of phase related to Glass transition temperature. **04**

(c) Explain in Detail about Transition and associated properties. **07**

****