

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III (NEW) EXAMINATION – WINTER 2021****Subject Code:3132606****Date:17-02-2022****Subject Name:Numerical methods & Viscoelastic models of Elastomers****Time:10:30 AM TO 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.
4. Simple and non-programmable scientific calculators are allowed.

	Marks
Q.1 (a) List the properties possessed by every amorphous polymer providing crosslinking above its glass transition temperature.	03
(b) How physical crosslinks are different than chemical crosslinks?	04
(c) A string 4 mm in diameter has original length 2m. The string is pulled by a force of 200N. If the final length of the spring is 2.02m, determine : (a)Stress ; (b) strain ; (c) Young's modulus	07
Q.2 (a) Define the terms: (i) Newtonian Fluid (ii) Time dependent Non- Newtonian fluid (iii) Viscoelastic fluid	03
(b) Give the difference between thixotropic fluid and Rheopectic fluid.	04
(c) Discuss in detail about the classification of Fluids.	07
OR	
(c) Explain in detail about the behavior of Pseudo plastic fluid.	07
Q.3 (a) Define the terms (i) Toughness (ii) Brittleness (iii) Ductility	03
(b) Write a brief not on Deborah number.	04
(c) Derive the equation for Creep Experiment for Voigt model.	07
OR	
Q.3 (a) List out the broad classification of Polymeric materials based on mechanical behavior.	03
(b) Give the difference between Relaxation and Retardation spectra.	04
(c) Discuss in detail about the Four parameter model.	07
Q.4 (a) Define the terms: (i) Dynamic viscosity (ii) Kinematic viscosity (iii) Intrinsic Viscosity	03
(b) "Steel has high elasticity then rubber" Justify the statement.	04
(c) Draw the diagram of Oswald viscometer and Explain in detail about the viscosity measurement procedure.	07
OR	
Q.4 (a) Define the term Viscosity and write its Nomenclature.	03
(b) Why the Poisson's Ratio to be positive? Give its reason.	04
(c) Discuss in detail about "Viscosity Theory".	07

- Q.5** (a) Relate the Glass transition temperature and Melting point for symmetrical and unsymmetrical polymers respectively **03**
(b) Classify the different types of motions exhibited within a polymeric material. **04**
(c) Explain different plots showing variation of specific volume with temperature. **07**

OR

- Q.5** (a) Differentiate Crystalline and Amorphous material. **03**
(b) “The glass transition temperature of a polymer is influenced by its molecular weight.”-Justify the statement. **04**
(c) Discuss in detail about the factors influencing the Glass transition temperature. **07**
