

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III(NEW) EXAMINATION – SUMMER 2023****Subject Code:3132604****Date:28-07-2023****Subject Name:Rubber Physics & its thermodynamics****Time:02:30 PM TO 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.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) State Zero and First law of thermodynamics. **03**
 (b) A man circling the earth in a spaceship weighed 200 N at location there the local gravitational acceleration was 2m/s^2 . Calculate the mass of the man and his weight on the earth. **04**
 (c) Derive relationship between C_p and C_v . **07**
- Q.2** (a) Brief out meaning of a spontaneous reaction in terms of enthalpy and entropy changes. **03**
 (b) Write down any four limitations of first law of thermodynamics. **04**
 Discuss the concept of polymer dissolution with respect to **07**
 (c) thermodynamic behavior of polymers.
- OR**
- (c) Discuss in detail about Carnot's Theorem. **07**
- Q.3** (a) What do you mean by R-Class rubber? Give any one example with structure. **03**
 (b) Brief out the given terms:(1)Segmental Motion (2) Molecular motion **04**
 (c) Discuss the conditions which are necessary for rubber like elasticity in polymers. **07**
- OR**
- Q.3** (a) What do you mean by M-Class rubber? Give any one example with structure. **03**
 (b) Brief out the general rules for polymer solubility. **04**
 (c) Discuss in detail about the characteristic properties of rubber. **07**
- Q.4** (a) Define the given terms with respect to rubber:(i) Static Friction(ii)Rolling Friction(iii) Sliding Friction **03**
 (b) Differentiate the rubbery deformation and elastic deformation. **04**
 (c) With schematic diagram, explain the method used to measure the surface tension of liquid. **07**
- OR**
- Q.4** (a) Define the given terms with respect to rubber:(i)Young's Modulus(ii)Shear Modulus(iii)Bulk Modulus **03**
 (b) Write a short note on refractive index of polymers. **04**
 (c) With schematic diagram, explain the methods used to measure the viscosity of rubber solution. **07**
- Q.5** (a) Give classification of polymers with respect to it's thermal behavior with suitable examples. **03**
 (b) Differentiate the chain growth polymerization and Step growth polymerization. **04**
 (c) Discuss in detail about the bulk polymerization technique. **07**

OR

- Q.5** (a) Give classification of polymers with respect to it's main chain backbone with suitable example. **03**
- (b) Write a short note on initiators. **04**
- (c) Discuss in detail about the solution polymerization technique. **07**
