

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (NEW) EXAMINATION – WINTER 2021

Subject Code:3132604

Date:21-02-2022

Subject Name:Rubber Physics & its thermodynamics

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.

|           |     |  |    |
|-----------|-----|--|----|
| Q.1       | (a) | Give classification of polymers based on their origin with suitable examples.  | 03 |
| Q.1       | (b) | Write a short note on initiator.   | 04 |
| Q.1       | (c) | Derive the relationship between $C_p$ and $C_v$ .  | 07 |
| Q.2       | (a) | What is meant by adiabatic process, isobaric process and isochoric process?  | 03 |
| Q.2       | (b) | Write any four limitations of First Law of Thermodynamics.   | 04 |
| Q.2       | (c) | Derive the formula for entropy change of an ideal gas.   | 07 |
| <b>OR</b> |     |  |    |
| Q.2       | (c) | Explain the Basic Concept of Ceiling Temperature.  | 07 |
| Q.3       | (a) | Differentiate Extensive properties & Intensive properties  | 03 |
| Q.3       | (b) | Explain the effect of steric strain on heat of polymerization with suitable example  | 04 |
| Q.3       | (c) | Describe the structure property relations in rubber.   | 07 |
| <b>OR</b> |     |  |    |
| Q.3       | (a) | Describe the meaning of a spontaneous reaction in terms of enthalpy and entropy changes.                                     | 03 |
| Q.3       | (b) | Mention the basic condition required for Thermodynamic investigation of polymer-polymer systems for three component systems. | 04 |
| Q.3       | (c) | Discuss in detail about chain growth polymerization.   | 07 |
| Q.4       | (a) | State Archimedes Principle with law of floatation.   | 03 |
| Q.4       | (b) | Differentiate the rubbery deformation and elastic deformation.   | 04 |
| Q.4       | (c) | Discuss in detail about refractive index of polymers.  | 07 |
| <b>OR</b> |     |  |    |
| Q.4       | (a) | Define the given terms with respect to rubber: (1) Static Friction(2) Rolling Friction (3)Sliding Friction                   | 03 |
| Q.4       | (b) | With the schematic diagram, explain the method of surface tension measurement.   | 04 |
| Q.4       | (c) | Discuss in detail about the characteristic properties of rubber.   | 07 |
| Q.5       | (a) | Write in brief about the molecular motions observed in rubber.   | 03 |
| Q.5       | (b) | Give example of R-Class rubber and M-Class rubber respectively with their structures.  | 04 |
| Q.5       | (c) | Discuss in detail about the bulk polymerization technique with their merits and demerits.                                    | 07 |
| <b>OR</b> |     |  |    |
| Q.5       | (a) | Define the given terms:(1) Bulk Modulus(2) Shear Modulus(3)Young's Modulus   | 03 |
| Q.5       | (b) | Write down the general rules for polymer solubility.   | 04 |
| Q.5       | (c) | Discuss in detail about the solution polymerization technique with their merits and demerits,                                | 07 |

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