Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – WINTER 2023

Subject Code:3132604 Date:18-01-2024

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)**	A man whose weight is 200 N takes 2 min. for climbing up a staircase. What is the power developed in him if the staircase is made up of 20 stairs each 0.5 m in height?	**03**
	(b)	Differentiate Extensive Properties and Intensive Properties.	**04**
	(c)	Prove that PV^{γ} = constant for adiabatic process.	**07**
Q.2	**(a)**	State First and Second law of Thermodynamics respectively.	**03**
	(b)	Define the given terms: (1) System (2) Surrounding (3) Boundary (4) Process	**04**
	(c)	What do you mean by 'Heat of Polymerization'? Explain in detail with respect to thermodynamics related to polymerization process.	**07**
		OR	
Q.2	**(c)**	Explain in detail about the concept of 'ceiling temperature'.	**07**
Q.3	**(a)**	What do you mean by three component system? Also write about it's application in polymer industry.	**03**
	(b)	Outline enthalpy of mixing of two polymers for binary polymer-polymer systems.	**04**
	(c)	Explain the conditions necessary for rubber like elasticity in polymers.	**07**
		OR	
Q.3	**(a)**	Brief out the term 'configuration and confirmation' respectively with respect to polymer chain flexibility.	**03**
	(b)	Indentify Rotational barrier of polymer chain flexibility and write on it.	**04**
	(c)	Explain structure property relationship in rubber.	**07**
Q.4	**(a)**	Define the given terms:(i) Functionality (ii) Polymerization(iii)Degree of Polymerization	**03**
	(b)	Differentiate the behavior of low molecular weight compound and polymer.	**04**
	(c)	Explain the salient features of solution polymerization technique.	**07**
		OR	
Q.4	**(a)**	Define the given terms:(i) Initiator(ii)Inhibitor (iii)Chain Transfer Agent	**03**
	(b)	Classify the polymers on the basis of their thermal behavior and application respectively.	**04**
	(c)	Explain the salient features of suspension polymerization.	**07**
Q.5	**(a)**	What do you mean bulk modulus?	**03**
	(b)	With labeled diagram, state Archimedes principle of floatation. Also give the possible errors associated with density measurement by using this principle.	**04**
	(c)	Explain in detail about the different types of friction observed in rubber with suitable examples.	**07**

OR

Q.5	**(a)**	What do you mean by shear modulus?	**03**
	(b)	Differentiate rubbery deformation and elastic deformation.	**04**
	(c)	Explain in detail about the major electrical properties observed in rubber.	**07**

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