Enrolment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - VII EXAMINATION - SUMMER 2025

Subject Code: 3172616 **Date: 08-05-2025**

Subject Name: Silicone Rubber Technology

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.**

			Marks
Q.1	**(a)**	Explain the basic structure of an organo silicone compound.	**03**
	(b)	Illustrate the steps involved in the manufacturing process of silicone elastomers.	**04**
	(c)	Create a comparative table showing the nomenclature, structure, and application areas of at least three types of silicone elastomers.	**07**
Q.2	**(a)**	State the key difference between direct and organometallic syntheses of organosilanes.	**03**
	(b)	Explain why the direct synthesis of organosilanes does not proceed ideally in practice.	**04**
	(c)	Evaluate the direct synthesis method in terms of its industrial scalability, product flexibility, and process limitations.	**07**
		OR	
	(c)	Develop the mechanism, stereochemistry, and synthetic utility of hydrosilylation reactions involving Si—H and alkenes.	**07**
Q.3	**(a)**	Draw chemical structures of the following: (i) Methyl siloxane, (ii) Vinyl methyl siloxane	**03**
	(b)	List out chemical names of platinum catalysts and platinum inhibitors and draw its structure.	**04**
	(c)	Demonstrate the mechanism of peroxide curing using chemical equations and describe them in your own words. Also trace out the pros and cons of peroxide curing over platinum curing.	**07**
		OR	
	(a)	List three alkali metal organometallic compounds used in organic synthesis.	**03**
	(b)	Differentiate between Si—H bond addition and substitution reactions.	**04**
	(c)	Illustrate a reaction between an organolithium compound and a ketone, and show the product.	**07**
Q.4	**(a)**	Demonstrate how the use of silicone oil can affect the processability of a silicone rubber compound.	**03**
	(b)	Analyze the effect of crepe hardening in silicone rubber compound.	**04**
	(c)	Propose a troubleshooting framework for issues commonly encountered during the injection molding process for silicone rubber parts. Include solutions for common problems like air traps, flow marks, and incomplete filling.	**07**

OR

	(a)	Apply your knowledge of flame retardants to suggest additives for improving fire resistance in silicone rubber.	**03**
	(b)	Analyze why sulfur fails to form cross-links in silicone rubber.	**04**
	(c)	Evaluate the effectiveness of different molding techniques (compression, transfer, injection, and extrusion molding) in the context of heat vulcanizing silicone rubbers. Which method would you recommend for producing complex silicone rubber components and why?	**07**
Q.5	**(a)**	List three important properties of RTV silicone rubber.	**03**
	(b)	Compare the applications of RTV-1 and RTV-2 silicone systems.	**04**
	(c)	Analyze the role of crosslinking in determining the final properties of water-based silicone elastomers.	**07**

OR

	(a)	What is the primary difference between RTV-1 and RTV-2 silicones?	**03**
	(b)	Discuss the importance of curing time and temperature in RTV silicone processing.	**04**
	(c)	Discuss future development trends in water-based silicone elastomers with a focus on sustainability, film performance, and industrial scalability.	**07**

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