

Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering - SEMESTER - IV EXAMINATION - WINTER 2025

Subject Code: 3142601

Date: 13-11-2025

Subject Name: Rubber Compounding Materials

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.**

	Marks
Q.1 (a) Define hydrocarbon and list its types used in rubber compounding .	03
(b) Describe how inorganic fillers influence mechanical properties of rubber.	04
(c) Analyze the difference between black and non-black fillers in mechanical performance.	07
Q.2 (a) What are phenolic antioxidants? Give two examples.	03
(b) Describe the mechanism of ozone attack on rubber.	04
(c) Explain the manufacturing process of ZnO in detail.	07
OR	
(c) Mention the Compounds of Aluminum used in Rubber industry in detail.	07
Q.3 (a) Describe how accelerators influence vulcanization rate .	03
(b) Differentiate between phenolic and amine antioxidants.	04
(c) Justify the use of MgO as partial activator replacement for ZnO .	07
OR	
(a) Which important factors must be considered when selecting an antioxidant system?	03
(b) Give the importance of Recurring Theories.	04
(c) Propose a compounding strategy to reduce compound density for Bush compound.	07
Q.4 (a) Define the term Plasticizers & give its importance in Rubber compounding.	03
(b) Differentiate between Golden Factice and Brown Factice?	04
(c) Analyze the effects of carbon black grades on compound properties.	07
OR	
(a) List out the classification of Pigments.	03
(b) Mention the classification of Rubber Additives.	04
(c) Analyze why high-structure carbon black improves modulus.	07

- Q.5 (a)** What are the functions of bonding agents? **03**
- (b)** Develop a recipe for rubber with high flexibility and low heat buildup. **04**
- (c)** A customer requires 10,000 Rubber Gaskets per month weighing 45 g each. The compound price is ₹160/kg. (a) Calculate the monthly material requirement. (b) Suggest suitable molding method. **07**

OR

- (a)** Define carbon black and state its importance in compounding. **03**
- (b)** Write about the “Dinitroso Pentamethylene Tetramine.” **04**
- (c)** You are asked to recommend filler loading to achieve Shore A hardness of 70 and tensile strength above 15 MPa for an automotive mount. Justify your formulation choice. **07**
