

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

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

## GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-V EXAMINATION – WINTER 2025

Subject Code:3152601

Date:19-11-2025

Subject Name:Vulcanization

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.

|     |                                                                                                               | Marks |
|-----|---------------------------------------------------------------------------------------------------------------|-------|
| Q.1 | (a) “Sulphur is used as universal vulcanizing agent” Justify it.                                              | 03    |
|     | (b) Construct a labeled diagram showing the different types of crosslinks formed during sulfur vulcanization. | 04    |
|     | (c) Draw the schematic diagram of Rheograph. Explain it in detail.                                            | 07    |
| Q.2 | (a) Define the term Crosslink Density. Write their significance also.                                         | 03    |
|     | (b) Summarize the advantages and disadvantages of Sulfur cure.                                                | 04    |
|     | (c) Explain the vulcanization of thick rubber article.                                                        | 07    |
| OR  |                                                                                                               |       |
| Q.3 | (c) Explain the reaction chemistry of Sulphur Vulcanization.                                                  | 07    |
|     | (a) Which vulcanizing agent is chosen to cure Neoprene Rubber? Why?                                           | 03    |
|     | (b) Illustrate post vulcanization reaction network reaction with suitable diagram.                            | 04    |
| Q.3 | (c) Explain in detail about ‘Thiourea’ class accelerators.                                                    | 07    |
| OR  |                                                                                                               |       |
| Q.3 | (a) Which radical forms of peroxide are preferred for elastomer curing?                                       | 03    |
|     | (b) Differentiate the vulcanization properties of natural rubber and synthetic rubber.                        | 04    |
|     | (c) Short note on: “Sulphenamide Accelerator”.                                                                | 07    |
| Q.4 | (a) What do you mean by cold cure?                                                                            | 03    |
|     | (b) How is vulcanization carried out using a Rotocure?                                                        | 04    |
|     | (c) Discuss in detail about the limitations of vulcanization temperatures.                                    | 07    |
| OR  |                                                                                                               |       |
| Q.4 | (a) How vulcanization is carried out in jacketed Autoclave?                                                   | 03    |
|     | (b) Give the advantages and disadvantages of Liquid Curing Method.                                            | 04    |

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|------------|-----|------------------------------------------------------------------------------------------|----|
|            | (c) | Discuss in detail about the allotropic forms of sulphur.                                 | 07 |
| <b>Q.5</b> | (a) | List two examples of peroxides containing a carboxyl group, along with their structures. | 03 |
|            | (b) | Classify methods for assessment of state of cure. Write on any one.                      | 04 |
|            | (c) | Explain detail about microwave vulcanization technique.                                  | 07 |

**OR**

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|------------|-----|--------------------------------------------------------------------------------------------------------------------------|----|
| <b>Q.5</b> | (a) | What do you mean by pressure less vulcanization technique? List the products which are cured by this technique.          | 03 |
|            | (b) | Write a short note on Resin cure.                                                                                        | 04 |
|            | (c) | Explain effect of crosslink type and structure on given properties of vulcanizate: (i) Tensile strength (ii) Resilience. | 07 |

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