

# GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VII EXAMINATION – WINTER 2025

**Subject Code:3172316**

**Date:01-12-2025**

**Subject Name:Plastic Additives, Compounding and Blends**

**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     |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Q.1</b> | (a) Explain the mechanism of Polymer Oxidation.                                                                                                                                                                         | <b>03</b> |
|            | (b) Explain the mechanism of Anti oxidants. List types of Anti oxidants.                                                                                                                                                | <b>04</b> |
|            | (c) Explain Technical Requirements of additives.                                                                                                                                                                        | <b>07</b> |
| <b>Q.2</b> | (a) Define: (i) Additives (ii) compounding (iii) Polymer Blends and Alloys                                                                                                                                              | <b>03</b> |
|            | (b) Define: (i) Homologous Polymer Blend (ii) Compatible Polymer Blend (iii) Interpenetrating Polymer Network (iv) Antioxidants                                                                                         | <b>04</b> |
|            | (c) Which are the reasons to make Polymer Alloys/Blends?                                                                                                                                                                | <b>07</b> |
|            | <b>OR</b>                                                                                                                                                                                                               |           |
|            | (c) Explain in detail about Antistatic Agents.                                                                                                                                                                          | <b>07</b> |
| <b>Q.3</b> | (a) Compare: Pigments and Dyes                                                                                                                                                                                          | <b>03</b> |
|            | (b) Explain about Chemical Blowing Agents.                                                                                                                                                                              | <b>04</b> |
|            | (c) Explain about Banbury Mixer or Ribbon blender with neat sketch.                                                                                                                                                     | <b>07</b> |
|            | <b>OR</b>                                                                                                                                                                                                               |           |
| <b>Q.3</b> | (a) Explain about Antiblocking Agent with basic mechanism of action.                                                                                                                                                    | <b>03</b> |
|            | (b) What is Toughening Agent? Explain role of it in Polymer with suitable example.                                                                                                                                      | <b>04</b> |
|            | (c) Explain detail classification of Additives with examples.                                                                                                                                                           | <b>07</b> |
| <b>Q.4</b> | (a) Define Flame Retardant( FR). Explain mode of action of FR.                                                                                                                                                          | <b>03</b> |
|            | (b) Which four basic methods used for compounding of Plastic and Additives?                                                                                                                                             | <b>04</b> |
|            | Compare: Additives and Compounding                                                                                                                                                                                      |           |
|            | (c) Explain in detail about PC/ABS blend.                                                                                                                                                                               | <b>07</b> |
|            | <b>OR</b>                                                                                                                                                                                                               |           |
| <b>Q.4</b> | (a) Explain: Two Roll Mill used for compounding of Polymer.                                                                                                                                                             | <b>03</b> |
|            | (b) List the methods of Blending. List advantages and disadvantages of Melt Blending.                                                                                                                                   | <b>04</b> |
|            | (c) Two miscible Polymers A and B are blended in weight ratio of 40: 60. If the glass transition temperature T <sub>g</sub> of Polymer A is -20°C and that of Polymer B is 90°C. Calculate the T <sub>g</sub> of Blend. | <b>07</b> |
| <b>Q.5</b> | (a) Explain Miscibility and Flow behavior of Polymer Blends.                                                                                                                                                            | <b>03</b> |
|            | (b) List the fundamental step to design ideal blend.                                                                                                                                                                    | <b>04</b> |
|            | (c) Explain working of Scanning Electron Microscope (SEM) with neat diagram.                                                                                                                                            | <b>07</b> |

**OR**

- Q.5**
- |            |                                                                                |           |
|------------|--------------------------------------------------------------------------------|-----------|
| <b>(a)</b> | Define Blowing Agents. List the various methods used to form cellular plastic. | <b>03</b> |
| <b>(b)</b> | Explain about additives used for Recycling of Plastics.                        | <b>04</b> |
| <b>(c)</b> | Explain about Twin Screw Extruder used for compounding of Plastics.            | <b>07</b> |

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