

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2024****Subject Code:3162608****Date:22-05-2024****Subject Name:Reverse Engineering and Analysis of Rubber Products****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) Which solvents are conventionally used in extraction analysis of rubber? Also give practical significance of extraction analysis with respect to reverse engineering of rubber? **03**
- (b) Construct flow diagram indicating steps associated with reverse engineering of rubber and rubber related materials. **04**
- (c) Explain in detail about the chemical digestion method and it's role in reverse engineering of rubber. **07**
- Q.2** (a) Define the given terms:(i) Microscopy (ii) Optical Microscopy (iii) Electron Microscopy **03**
- (b) Compare secondary electrons with back scattered electrons. **04**
- (c) With labeled diagram, explain Scanning Electron Microscopy (SEM) with it's major components. **07**
- OR
- (c) With labeled diagram, explain Transmission Electron Microscopy (TEM) with it's major components. **07**
- Q.3** (a) Define the given terms with respect to thermal Analysis: (i)Peak Width(ii) Peak Height(iii) Peak Area **03**
- (b) List the types of Differential Scanning Calorimetry (DSC) Assembly. Write on any one. **04**
- (c) With schematic diagram, write about different possible option of location of thermocouple in thermo balance. Which one is preferable? Why? **07**
- OR
- Q.3** (a) Which rubber properties can be assessed by Dynamic Mechanical Analysis (DMA)? **03**
- (b) Distinguish Differential Scanning Calorimetry(DSC) and Differential Thermal Analysis (DTA). **04**
- (c) With illustrative example, explain the different properties of rubber and rubber related material which can be determined by Thermo gravimetric Analysis (TGA). **07**
- Q.4** (a) What do you mean by distribution ratio? List the factors affecting it. **03**
- (b) Compare Column Chromatography with and Planer Chromatography. **04**
- (c) Explain in detail about Gas Chromatography (GC). **07**
- OR
- Q.4** (a) What do you mean by solute property detector? Also give their examples. **03**
- (b) List out the practical steps associated with Thin Layer Chromatography (TLC). Write about any one step. **04**
- (c) Explain in detail about Gel Permeation Chromatography (GPC). **07**

- Q.5** (a) What do you mean by red shift with respect to UV-Visible spectroscopy? **03**
(b) Differentiate the single beam spectrophotometer and double beam spectrophotometer. **04**
(c) Explain in detail about Infrared spectroscopy. **07**

OR

- Q.5** (a) What do you mean by blue shift with respect to UV-Visible spectroscopy? **03**
(b) List out the major components of monochromator. Also give function of each of them. **04**
(c) Explain in detail about Beer-Lambert's Law with spectroscopy. **07**
