

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

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

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER– VI (New) EXAMINATION – WINTER 2019****Subject Code: 2162604****Date: 11/12/2019****Subject Name: Characterisation of Rubber****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.

- Q.1** (a) Why is it necessary to store the rubber product at standard conditions? Which ISO standard is used for the same? **03**
- Q.1** (b) Give the different circumstances in which standard test method is used. Also mention the classification of sources of standards. **04**
- Q.1** (c) With suitable diagrams, explain the various methods used to prepare test specimen from rubber. **07**
- Q.2** (a) Write down the spot test to characterize the following rubbers: (1) SBR (2) NBR **03**
- Q.2** (b) Write down the procedure for free sulphur determination test. **04**
- Q.2** (c) Explain the Bragg's law. Give advantages and disadvantages of Scanning Electron Microscopy (SEM). **07**
- OR**
- Q.2** (c) Explain the operation of Transmission Electron Microscopy (TEM) with diagram showing it's major components. **07**
- Q.3** (a) Define the given terms with respect to thermal analysis of rubber: (i) Peak (ii) Base Line (iii) Heating Rate **03**
- Q.3** (b) Differentiate the Differential Scanning Calorimetry (DSC) and Differential Thermal Analysis (DTA). **04**
- Q.3** (c) With Suitable examples of rubber and rubber related materials, write about the applications of Thermogravimetric Analysis (TGA). **07**
- OR**
- Q.3** (a) Define the given terms with respect to thermal analysis of rubber: (i) Peak Width (ii) Peak Height (iii) Peak Area **03**
- Q.3** (b) Write a short note on 'Thermobalance'. **04**
- Q.3** (c) Discuss different types of transitions observed in Dynamic Mechanical Analysis by taking an example of EPDM rubber. **07**
- Q.4** (a) With schematic diagram, explain the term  $R_f$  value. **03**
- Q.4** (b) Explain the given features with respect to Chromatography: (i) Retention Time (ii) Retention Volume **04**
- Q.4** (c) Discuss in detail about the classification of Gas Chromatography (GC). **07**
- OR**
- Q.4** (a) Which different types of columns are used in Gas Chromatography (GC)? **03**
- Q.4** (b) Explain the given features with respect to Chromatography: (i) Relative Retention (ii) Resolution **04**
- Q.4** (c) Discuss in detail about the High Performance Liquid Chromatography (HPLC). **07**

- Q.5** (a) Write a brief note on 'finger print region'. **03**
- Q.5** (b) What do you mean by interferometer? Give advantages of Fourier Transform Infrared Spectroscopy (FTIR) over Infrared Spectroscopy. **04**
- Q.5** (c) Discuss in detail about Beer-Lambert's law. Also give its application. **07**
- OR**
- Q.5** (a) Give classification of Infrared (IR) band. **03**
- Q.5** (b) Discuss in detail about Nuclear Magnetic Resonance Spectroscopy(NMR). **04**
- Q.5** (c) Discuss the different types of transitions observed during ultraviolet spectroscopy. **07**

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