

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – SUMMER • 2014****Subject Code: 162604****Date: 28-05-2014****Subject Name: Characterization of Rubber****Time: 10:30 am - 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. Write the answer to the points.

- Q. 1** (a) Discuss in detail about the classification of standards used to characterize the rubber. **07**
- (b) Answer the following
- i Write down the procedure to determine the chloroform extract of unvulcanized rubber. Also write down its result. **05**
- ii Explain the theory of free sulphur determination test. **02**
- Q. 2** (a) Discuss in detail about fractional precipitation technique with its importance. **07**
- (b) Answer the following
- i Give the advantages and disadvantages of Scanning Electron Microscopy (SEM). **04**
- ii Explain the Bragg's Law. **03**
- OR**
- Q. 2** (b) Answer the following
- i Explain the term secondary electrons and backscattered electrons respectively. **05**
- ii Give the practical significance of x-ray scattering techniques. **02**
- Q. 3** (a) Answer the following
- i Write down the general principles of Temperature Modulated Differential Scanning Calorimetry (TMDSC). **05**
- ii Write a brief note on free vibration. **03**
- Q. 3** (b) Discuss the classification of Thermogravimetry (TG) curves. **06**
- OR**
- Q. 3** (a) Answer the following
- i Write down the experimental conditions preferred for Temperature Modulated Differential Scanning Calorimetry (TMDSC). **04**
- ii Which stages are involved in Dynamic Mechanical Analysis (DMA) measurement? Also mention the factors exerting an influence on apparatus and specimen during analysis. **03**
- (b) Discuss the factors affecting the result of Thermogravimetry. **07**

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- Q. 4** (a) Answer the following

- i** Define the term Gas Chromatography (GC). Write down the advantages and drawbacks of Gas Chromatography. **04**
 - ii** Write down the functions of bulk property detector and solute property detector respectively. **03**
- (b)** Explain the given chromatographic parameters:(i) Relative Retention (ii) Retention Time (iii) Column Efficiency **07**
- OR**
- Q. 4** **(a)** Answer the following
- i** Write a short note on different types of column used in Gas Chromatography (GC). **05**
 - ii** What do you mean by R_f value? Which parameters affect the R_f value? **02**
- (b)** Discuss in detail about the important components of High Pressure Liquid Chromatography (HPLC) system. **07**
- Q. 5** **(a)** Answer the following
- i** Why Fourier Transform Infrared Spectroscopy (FTIR) is preferred over filter methods of infrared spectral analysis? **04**
 - ii** Define the given terms:(i)Chromophore (ii) Auxochrome (iii) Resonance **03**
- (b)** Describe different sample preparation methods used in Infrared Spectroscopy (IR). Which one is preferred? Why? **07**
- OR**
- Q. 5** **(a)** Answer the following
- i** Explain the sample analysis process of Fourier Transform Infrared Spectroscopy (FTIR). **05**
 - ii** Define the given terms: (i)Bathochromic Shift (ii)Hypochromic Shift **02**
- (b)** Draw labeled diagram of Nuclear Magnetic Resonance (NMR) spectrometer. Write down the general comments concerning the use of Nuclear Magnetic Resonance spectroscopy specifically for rubber. **07**
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