Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2162604 **Date: 05/05/2017**

Subject Name: Characterisation of Rubber

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. **Draw figures wherever necessary**

Q.1		**Answer the following**	**14**
	1.	Give examples of National Standards.	
	2.	What is meaning of SCI WGI?	
	3.	Define the term 'Thermal Analysis'	
	4.	Write down major difference between Differential Scanning Calorimetry (DSC) and Differential Thermal Analysis (DTA).	
	5.	What do you mean by Oxygen Induction Time (OIT)?	
	6.	Write down the formula to calculate the acetone extract of rubber vulcanizate.	
	7.	Define the term pyrolysis with respect to rubber.	
	8.	Give the classification of Gas Chromatography.	
	9.	What is R_f value?	
	10.	What is alternative name of Gel Permeation Chromatography?	
	11.	Give the types of spectrophotometer.	
	12.	Which different energy levels are observed in polymeric material?	
	13.	Which characteristic features of rubber can be determined by Small Angle X-ray Scattering(SAXS)?	
	14.	State Bragg's law.	
Q.2	**(a)**	What do you mean by Thermodialatometry? Which properties of rubber can be determined by this?	**03**
Q.2	**(b)**	Write on the characteristics of good thermobalance design.	**04**
Q.2	**(c)**	Discuss in detail about the classification of Thermogravimetric Analysis curve.	**07**
		OR	
Q.2	**(c)**	With suitable examples of rubber and rubber related material, discuss the applications of Differential Scanning Calorimetry(DSC).	**07**
Q.3	**(a)**	What do you mean by distribution ratio? List the factors affecting it.	**03**
Q.3	**(b)**	Explain the given features with respect to chromatography: (i)Retention Time(ii)Retention Volume	**04**
Q.3	**(c)**	Discuss in detail about the Thin Layer Chromatography (TLC).	**07**
		OR	
Q.3	**(a)**	List the types of the detectors used in Gas Chromatography (GC).	**03**
Q.3	**(b)**	Explain the given features with respect to chromatography: (i) Relative Retention(ii)Resolution	**04**
Q.3	**(c)**	Discuss in detail about the major components of High Performance Liquid Chromatography (HPLC).	**07**
Q.4	**(a)**	What do you mean by absorption spectra?	**03**
Q.4	**(b)**	Write a short note on dispersing devices.	**04**

Q.4	**(c)**	Discuss in detail about the Beer-Lambert's law with its applications and limitations.	**07**

OR

Q.4	**(a)**	What do you mean by emission spectra?	**03**
Q.4	**(b)**	How result of Nuclear Magnetic Resonance (NMR) is expressed?	**04**
Q.4	**(c)**	How do Infrared (IR) spectra originate? With suitable examples, explain the application of Infrared spectroscopy in characterization of rubber.	**07**
Q.5	**(a)**	What do you mean by secondary electrons?	**03**
Q.5	**(b)**	Give the advantages and disadvantages of Scanning Electron Microscopy (SEM).	**04**
Q.5	**(c)**	Explain the given features with respect to Transmission Electron Microscopy:(i)Sample Preparation(ii)Operation	**07**

OR

Q.5	**(a)**	What do you mean by back scattered electrons?	**03**
Q.5	**(b)**	What do you mean by specimen interaction volume? List the factors affecting it.	**04**
Q.5	**(c)**	List the major components the Scanning Electron Microscope. Explain any two in detail.	**07**

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