Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2013

Subject code: 1724007 **Date: 07-06-2013**

Subject Name: Weathering of Rubbers

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.**

Q.1	**(a)**	Discuss in detail about the thermo-oxidative degradation with its reaction mechanism.	**07**
(b)	**i**	Explain the basic phenomenon of mechanical degradation. Also give the parameters which affect the rate of mechanical degradation.	**04**
	ii	Why chain end degradation is termed as depolymerization?	**03**
Q.2	**(a)**	List the different types of degradation agents. Explain their effects on rubber products.	**07**
(b)	**i**	Write a short note on photo stabilizers.	**05**
	ii	Which methods are available to prepare the test specimen for testing?	**02**
		OR	
(b)	**i**	Which principle reactions are observed during photo degradation of rubber?	**04**
	ii	Which approaches can be made to improve ozone resistance of rubber?	**03**
Q.3	**(a)**	Discuss the tensile stress strain properties measurement of rubber products.	**07**
(b)	**i**	Which indirect methods are available to monitor the ageing resistance?	**04**
	ii	Which considerations are made in durability test?	**03**
		OR	
Q.3	**(a)**	Discuss the compression set test to monitor the degradation.	**07**
(b)	**i**	Write down the factors which affect the choice of test parameters.	**04**
	ii	Hardness measurement is very attractive for monitoring degradation-Why?	**03**
Q.4	**(a)**	Discuss the accelerated test by taking an example of suitable degradation agent.	**07**
(b)	**i**	How an evaluation of crack is done after ozone ageing? Also show the relationship between crack size, crack density and stain.	**05**
	ii	Define the following terms: (i) Weathering (ii) Artificial Weathering	**02**
		OR	
Q.4	**(a)**	Give the name of the test which is to be conducted to measure volume change of rubber. Discuss that test in detail.	**07**
Q.4	**(b)**	Distinguish the types of fatigue tests. Discuss any one test in detail.	**07**
Q.5	**(a)**	Discuss the Arrhenius relationship to access the permanent effects of temperature as a degradation agent.	**07**
(b)	**i**	Explain the construction and working of DIN abrader.	**05**
	ii	Define the following terms: (i) Storage Modulus (ii) Loss Modulus	**02**
		OR	
Q.5	**(a)**	What do you mean by oxidative induction time? Describe the methods to determine the oxidative induction time with suitable example.	**06**
(b)	**i**	Describe the ways to express abrasion test results.	**05**
	ii	Write a brief note on dynamic modulus.	**03**

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