Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 2714002 **Date: 07-01-2015**

Subject Name: Mixing of Rubbers

Time: 02:30 pm - 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)**	Answer the following.	
	(i)	Draw the Schematic Diagram of Compound behavior in Internal Mixer.	**(03)**
	(ii)	Explain the different mechanisms used for incorporating Carbon Black into Elastomer.	**(04)**
	(b)	Give the scientific explanation for Regions of Processability behaviour of compound in Mixing Mill.	**(07)**
Q. 2	**(a)**	Discuss about factors which affect on Compaction process.	**(07)**
	(b)	Discuss the effect of fillers and rubber structures on tensile behavior of filled unvulcanized compound with suitable example.	**(07)**
		OR	
	(b)	Explain the Viscoelastic behavior of rubber during mixing in Internal Mixer.	**(07)**
Q. 3	**(a)**	Discuss Maxwell model for linear Viscoelastic response.	**(07)**
	(b)	Answer the following.	
	(i)	A vigot element has parameters E= 10^8N/m^2 and ɖ = 5*10^{10} N*S/m^2. Sketch the creep curve for this element if the imposed constant stress is 10^8N/m^2.	**(05)**
	(ii)	Explain the term Deborah number.	**(02)**
		OR	
Q. 3	**(a)**	Explain the viogt model for linear Viscoelastic response.	**(07)**
	(b)	Answer the following.	
	(i)	The constant s for a four parameter model are E_1 =5*10^{10} N/ m^2, $ɖ_2$ = 5*10^{10} N*S/m^2, E_3 =10^8 N/ m^2 and $ɖ_3$ = 5*10^8 N*S/m^2. For creep and creep recovery experiments calculate (a) The instantaneous elastic strain (ii) The recoverable retarded elastic strain (iii) Permanent Set .	**(05)**
	(ii)	List the various techniques available to characterize the Viscoelastic behavior of gum rubber.	**(02)**
Q. 4		List the outline of the proposed model of a Mixing mechanism and explain in detail.	**(14)**
		OR	
Q. 4	**(a)**	Short Note on: ñNano scale of Mixingò	**(07)**
	(b)	How effective energy of Mixing can be calculated in Internal Mixer? Explain it.	**(07)**
Q. 5	**(a)**	Justify the role of Liquid additives in Mixing of Rubber.	**(07)**
	(b)	Describe the causes of non-uniformity in feeding of extrusion mixing.	**(07)**
		OR	
Q. 5	**(a)**	ñThe ease of Mixing be quantified and be related to the appropriate properties of fillerò Justify the statement.	**(07)**
	(b)	Discuss the flow mechanism of rubber compound in Injection Molding Machine.	**(07)**

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