Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – V (NEW) EXAMINATION – WINTER 2015

Subject Code: 2152604 **Date:08/12/2015**

Subject Name: Rheology of Rubber

Time:10:30am to 1:00pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q. 1	**Answer the following.**		**(14)**
	(i)	**Define the terms: (i) Turbulent flow & (ii) Stress tensor.**	
	(ii)	**Write the Reiner and Riwlin equation.**	
	(iii)	**Give the range of Reynolds number for the Laminar flow with rippling in Falling Film system.**	
	(iv)	**Discuss the important role of Rheology in rubber field.**	
	(v)	**Define the term Rheology. Which was the first rheological relationship?**	
	(vi)	**Write the importance of Bingham number.**	
	(vii)	**Explain the test for determination of PRI**	
Q. 2	**(a)**	**Give the classification of Rheometer based on flow principles of Polymer melts and Solutions.**	**(07)**
Q. 2	**(b)**	**Short note on: "Shearing Disc (Mooney) Rheometer".**	**(07)**
		OR	
	(b)	**Describe in detail about velocity distribution in an Extruder system.**	**(07)**
Q. 3	**(a)**	**Explain the Ostwald-de waele model to find out viscosity.**	**(07)**
	(b)	**Discuss in detail about Velocity profile in Laminar flow.**	**(07)**
		OR	
Q. 3	**(a)**	**Explain the Ellis model to find out viscosity with suitable example.**	**(07)**
	(b)	**Give the name of instrument to measure the viscosity for Pseudoplastic material. Derive the relationship between Torque (G) and Angular velocity (Ω) for Pseudoplastic material.**	**(07)**
Q. 4	**(a)**	**How we can calculate the various quantities by using Momentum flux & Velocity distribution in Falling film system?**	**(07)**
	(b)	**Explain the effect of Molecular Motions on Rheology of Rubber.**	**(07)**
		OR	
Q. 4	**(a)**	**Derive the equation for the momentum flux distribution of flow through Circular tube.**	**(07)**

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	(b)	**Explain the effect of Pressure & Shear induced crystallization on Rheology of Rubber.**	**(07)**
Q. 5	**(a)**	**List the name of Elongational flow instruments. Explain any one in detail.**	**(07)**
	(b)	**Explain the one dimensional Plastic-Viscous model for rubber compound.**	**(07)**

OR

Q. 5	**(a)**	**Short note on: "Compression Flow Instruments".**	**(07)**
	(b)	**Derive the Energy equation for rheological model for elastomer.**	**(07)**

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