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

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2016

Subject Code:2152604 **Date:09/05/2016**

Subject Name:Rheology of Rubber

Time:02:30 PM to 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		**Answer the following.**	**(14)**
	(i)	**Define the term "Stress Tensor".**	
	(ii)	**What do you mean by Uniaxial and Biaxial Elongational viscosity?**	
	(iii)	**Write the power law model.**	
	(iv)	**Discuss the important role of Rheology in rubber field.**	
	(v)	**List various rheological models for polymers.**	
	(vi)	**Write the importance of Reynolds number.**	
	(vii)	**Write the importance of Bingham number.**	
Q. 2	**(a)**	**Explain the Boundary conditions for fluid in detail.**	**(07)**
Q. 2	**(b)**	**Explain the Ostwald-de waele model to find out viscosity.**	**(07)**
		OR	
Q. 2	**(b)**	**Explain in detail about Reiner-Philipoff model.**	**(07)**
Q. 3	**(a)**	**Derive the equation of maximum velocity for flow through a circular tube.**	**(07)**
	(b)	**Discuss the effect of molecular motions influence on the Rheology of rubbers.**	**(07)**
		OR	
Q. 3	**(a)**	**Determine the velocity distribution in extruder at below boundary condition. (i) $r = R_1$, $v_z = V$ (ii) $r = R_2$, $v_z = 0$.**	**(07)**
	(b)	**Explain the effect of pressure on the Rheology of rubbers.**	
Q. 4		**Write the accepted test methods to determine the Plasticity/Viscosity of rubber compounds. Explain the Capillary Rheometer in detail.**	**(14)**
		OR	
Q. 4	**(a)**	**List out the assumptions for development of the Hagen-Poiseuille law.**	**(07)**
	(b)	**Glycerine at 26.5^0 C is flowing through a horizontal tube 1 ft long and 0.1 in. inside diameter. For a pressure drop of 40 psi, the flow rate is 0.00398 ft^3 min^{-1}. The density of glycerine in centipoises. Determine the viscosity by using capillary viscometers.**	**(07)**
Q. 5	**(a)**	**Short note on: "Oscillatory Flow Instruments".**	**(07)**
	(b)	**Describe about Relaxation & Retardation in terms of Rheology.**	**(07)**

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OR

Q. 5	**(a)**	**List the quality control instruments for rheological studies of elastomer. Explain any one in detail.**	**(07)**
	(b)	**Explain the one dimensional Plastic-Viscous model for rubber compound.**	**(07)**

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