GUJARAT TECHNOLOGICAL UNIVERSITY ME – SEMESTER-1 (NEW) EXAMINATION – WINTER 2016

Subject Code: 2714002 Date:04/01/2017 Subject Name: Mixing of Rubber Time: 2:30 pm to 5:00 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. Discuss the importance of material testing, quality and process control with Q.1 14 respect to mixing phenomenon. Differentiate the elastic behavior and viscoelastic behavior of material. Describe **O.2** (a) 07 the viscoelastic behavior of rubber in internal mixer. Write in detail about the degree of penetration and degree of packing in carbon **(b)** 07 black. OR (b) Discuss the structure of aggregate and agglomerate. 07 (a) Write a short note on mastication and science of mill processability **Q.3** 07 (b) Explain the causes of non-uniformity in feeding of extrusion process. 07 OR (a) Write about the optimum state of elastomers for mixing. 0.3 07 (b) Explain all the aspects for the ease of mixing. 07 **O.4** (a) Explain the concept of rubber elasticity with respect to first law of 07 thermodynamaics. (b) Explain the mechanism of fracture of gum rubber. 07 OR **O.4** (a) Discuss the relationship between viscoelasticity and memory with respect to 07 rubber. (b) Discuss the viscoelastic characterization of rubber compound. 07 (a) Discuss the linear viscoelastic response of polymer by following the Vigot Q.5 07 model. (b) Give the graphical presentation of creep response of four parameter model. The 07 constants of four parameter model are $E_1=5*10^8$ N/m², $\eta_2=5*10^{10}$ N.s/m², E₃=10⁸ N/m² and η_3 =5*10⁸ N.s/m². For creep and creep recovery experiments calculate (i)The instantaneous elastic strain(ii)The recoverable retarded elastic strain (iii)The permanent set. OR (a) Discuss the linear viscoelastic response of polymer by following the Maxwell Q.5 07 model. (b) A Vigot element has parameter $E=10^8$ N/m² and $n=5*10^{10}$ N.s/m². Sketch the 07 creep curve for this element if the imposed constant stress is 10^8 N/m².

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