

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III (NEW) EXAMINATION – SUMMER 2024****Subject Code:3132306****Date:16-07-2024****Subject Name: Applied mathematics in Plastic Industry****Time:10:30 AM TO 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.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Define Stress, Young Modulus and Strain. **03**
 (b) Explain the three point bending. **04**
 (c) Explain the given topics **07**
 (i) Long term testing and short term testing
 (ii) Difference between Isometric and Isochronous graphs
- Q.2** (a) State the Pseudo- elastic design method for plastics. **03**
 (b) Explain the coefficient of thermal expansion. **04**
 (c) Explain the Maxwell model with mathematical expression for Plastic materials. **07**
- OR**
- (c) Explain the Kelvin-Voigt model with mathematical expression. **07**
- Q.3** (a) Explain polymer melt with example. **03**
 (b) Give the Generalized Hook's and Newtons law related to viscoelasticity **04**
 (c) Define deformation and explain it in detail in terms of Plastic material **07**
- OR**
- Q.3** (a) Define velocity gradient. **03**
 (b) Write application and advantages of Ram Extruder. **04**
 (c) Explain Burger model for Plastic. **07**
- Q.4** (a) Explain the swelling ratio. **03**
 (b) State the heat transfer during polymer processing **04**
 (c) A polystyrene sample of 0.02m^2 cross-sectional area is subjected to a creep load of 10^5 N . The load is removed after 30s. The Maxwell element accurately describes the behavior of polystyrene and that viscosity is $5 \times 10^9\text{ N.s/m}^2$, while Young's modulus is $3.45 \times 10^9\text{ N/m}^2$, calculate: The deformation recovered on the removal of the dead load **07**
- OR**
- Q.4** (a) Write short notes on stress concentration. **03**
 (b) The density of a composite made from unidirectional glass fibers in an epoxy matrix is 1950 kg/m^3 . If the densities of the glass and epoxy are known to be 2540 kg/m^3 and 1300 kg/m^3 , calculate the weight fraction of fibers in the composite **04**
 (c) Describe Experimental method of RAM Extruder. **07**
- Q.5** (a) Write Types of reinforcement in Plastics **03**
 (b) Discuss Residence Time and Relaxation Time. **04**
 (c) Describe the cone and plate Viscometer in detail. **07**
- OR**
- Q.5** (a) Write short notes on aspect Ratio. **03**
 (b) State the Deformation behavior of reinforced plastics **04**
 (c) Explain the longitudinal Properties and Properties parallel to longitudinal axis in continuous fibre composites **07**
