

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2023

Subject Code:3142607

Date: 06-02-2024

Subject Name:Rubber Rheology

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) Determine the flow of fluid having a relative density of 100 kg/m^3 , the viscosity of 0.5 Ns/m^2 with a velocity of 5 m/s through a pipe of 0.2 m . 03
- (b) Distinguish between laminar flow and turbulent flow. 04
- (c) Discuss in detail about the velocity profile of non-newtonian fluid flow. 07

- Q.2 (a) Give the difference between two parameter model and three parameter model with suitable example. 03
- (b) Draw the graph of pseudo plastic fluid and explain it in brief. 04
- (c) Discuss in detail about the Bingham plastic fluid. 07

OR

- (c) Describe the difference between Eyring & Eyring Powell models in detail. 07
- Q.3 (a) Give the importance of Stress Tensor and Stress Responses with suitable example. 03
- (b) Draw the Rheograph and explain the working principle of oscillating disk Rheometer. 04
- (c) Derive the equation of Velocity profile for flow through falling film. 07

OR

- Q.3 (a) Give a brief note on Sandwich Rheometer. 03
- (b) Distinguish between Oscillating disk Rheometer and Moving die Rheometer. 04
- (c) Draw the diagram of circular tube and derive the equation for velocity profile. 07
- Q.4 (a) Write the importance of viscosity with respect to fluid. 03
- (b) Mention the assumptions implied for the development of Hagen Poiseuille law. 04
- (c) Derive the volumetric flow rate equation for capillary viscometer. 07

OR

- Q.4 (a) Give the working principle of Rotational Rheometer. 03
- (b) Describe the Toms effect. 04
- (c) Draw the diagram of Cone & Plate viscometer and derive its equation. 07
- Q.5 (a) Write the application of Parallel Plates viscometer. 03
- (b) Give the difference between stress relaxation and creep relaxation. 04
- (c) Discuss in detail about the effect of temperature on Rheology of rubber. 07

OR

- Q.5 (a) Write the limitation of cone and plate viscometer. 03

- (b) List out the factors affecting the viscosity. **04**
- (c) Discuss in detail about the effect of molecular weight and molecular structure on Rheology of rubber. **07**
