Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 6 – EXAMINATION – SUMMER 2026

Subject Code: 3165106 **Date: 03/06/2026**

Subject Name: Engineering Properties of Biological Materials

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 engineering properties of biological materials. State their significance in processing.	**03**
	(b)	What are the physical properties of food grains? Explain the method to measure sphericity.	**04**
	(c)	Describe the process for determination of bulk density and true density with practical applications.	**07**
Q.2	**(a)**	Define porosity. How does it affect aeration in grains during storage?	**03**
	(b)	Write short notes on surface area and its role in drying.	**04**
	(c)	Explain the procedure to determine specific gravity of grains.	**07**
		OR	
Q.2	**(c)**	Explain the process for determining volume and roundness ratio of agricultural produce.	**07**
Q.3	**(a)**	What is thermal conductivity? How is it measured in food materials?	**03**
	(b)	Explain specific heat and thermal diffusivity with relevance to heating/cooling of foods.	**04**
	(c)	Discuss the concept and significance of coefficient of thermal expansion.	**07**
		OR	
Q.3	**(a)**	Define heat capacity and explain its use in refrigeration design.	**03**
	(b)	What is the heat of respiration? Discuss its effect on food quality.	**04**
	(c)	Explain the measurement techniques for thermal properties of food with suitable equipment.	**07**
Q.4	**(a)**	Define angle of repose and how is it used in storage structure design.	**03**
	(b)	Differentiate between static friction and kinetic friction.	**04**
	(c)	Explain aerodynamic properties and their relevance in grain separation.	**07**
		OR	
Q.4	**(a)**	Define terminal velocity and its relation with drag coefficient.	**03**
	(b)	Describe flow behavior of bulk granular materials in silos.	**04**
	(c)	Explain measurement of aerodynamic properties using terminal velocity setup.	**07**
Q.5			

	(a)	Define Newtonian and Non-Newtonian fluids with food examples.	**03**
	(b)	What is viscoelasticity? Give examples of viscoelastic food materials.	**04**
	(c)	Explain Pseudo-plastic, Dilatant, Thixotropic, Rheopectic and Bingham Plastic Foods.	**07**

OR

Q.5	**(a)**	Define stress and strain with a diagram.	**03**
	(b)	Explain elastic, plastic and viscous behavior in food materials. A	**04**
	(c)	How are rheological properties measured using viscometer? Describe with diagram.	**07**

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