

M.Tech. Food Technology
Semester I – Examination, 2024
Paper Title: Engineering Properties of Foods
Paper Code: MFTD-107

Time: 3 hours

Maximum Marks: 60

- Note:** 1. All the questions of Section A are compulsory.
2. Attempt any four questions from Section B.
3. Attempt any two questions from Section C.

Section A (12x1=12)

1. Choose the appropriate answer for the following multiple choice questions:

- (i) What physico-chemical characteristic is associated with the resistance of a material to deformation?
 - a) Shape
 - b) Porosity
 - c) Texture
 - d) Sphericity
- (ii) The ability of a material to conduct heat is measured by:
 - a) Thermal diffusivity
 - b) Specific heat
 - c) Thermal conductivity
 - d) Electrical resistance
- (iii) Which of the following is a rheological model used to describe the behavior of non-Newtonian fluids?
 - a) Hooke's Law
 - b) Newton's Law of Cooling
 - c) Bingham Plastic model
 - d) Ohm's Law
- (iv) In texture profile analysis, which parameter assesses the force required to compress a material?
 - a) Hardness
 - b) Elasticity
 - c) Cohesiveness
 - d) Adhesiveness
- (v) The ratio of inertial forces to viscous forces in fluid flow is characterized by:
 - a) Reynolds number
 - b) Drag coefficient
 - c) Terminal velocity
 - d) Coefficient of friction
- (vi) What property is related to a material's ability to store electrical energy?
 - a) Dielectric constant
 - b) Thermal conductivity
 - c) Specific heat
 - d) Energy absorption
- (vii) Creep stress relaxation is associated with the study of:
 - a) Rheology
 - b) Linear visco-elasticity
 - c) Plastic behavior
 - d) Texture profile analysis
- (viii) The angle formed by a pile of material when poured onto a surface is known as the:
 - a) Angle of repose
 - b) Drag coefficient
 - c) Sphericity angle
 - d) Frictional angle
- (ix) What is a characteristic of Newtonian fluids?
 - a) Viscosity depends on shear rate
 - b) Viscosity remains constant regardless of shear rate
 - c) Exhibits plastic behavior

- d) Displays creep stress relaxation
- (x) The property that measures the opposition to the flow of electric current in a material is:
- a) Dielectric constant b) Conductance
c) Thermal diffusivity d) Energy absorption
- (xi) Which unit of engineering properties is crucial for the design and operation of equipment involved in food processing?
- a) Thermal diffusivity b) Texture profile analysis
c) Surface area d) Drag coefficient
- (xii) What term refers to the volume of open spaces within a material?
- a) Porosity b) Sphericity
c) Terminal velocity d) Reynolds number

2. Explain the significance of the Reynolds number in fluid flow and its relevance in food processing.
3. Differentiate between Newtonian and Non-Newtonian fluids. Provide examples of each.
4. Elaborate on the concept of texture profile analysis and its applications in the food industry.
5. Discuss the role of rheological models in understanding the behavior of food materials.
6. How do physico-chemical characteristics such as shape and porosity impact the handling of raw and processed food products?

7. Discuss in detail the applications of specific heat, thermal conductivity, and thermal diffusivity in the design and operation of equipment for food processing.
8. Explain the significance of rheology in the study of food materials, covering topics such as Newtonian and Non-Newtonian fluid behavior, linear visco-elasticity, and creep stress relaxation.
9. Evaluate the importance of engineering properties in the process development and design of equipment for the handling, processing, and storage of both raw and processed food products. Provide specific examples to support your discussion.

Section A	Mapping	Section B	Mapping	Section C	Mapping
1	BTL2,3; CO1, 2,3,4; PO1,2,4,5	2	BTL3,4 ;CO3 ;PO4	7	BTL3,5 ;CO4 ;PO8
		3	BTL2,4 ;CO3 ;PO3	8	BTL4,5 ;CO3 ;PO3
		4	BTL2,4 ;CO1 ;PO3	9	BTL5,6 ;CO4 ;PO7
		5	BTL4,5 ;CO3 ;PO2		
		6	BTL2,3 ;CO1 ;PO8		