

MOCK EXAM

19AGB303 Irrigation and Drainage Engineering

PART A

- 1 Relate conductivity and resistivity
2. List the three types of rheological behavior exhibited by materials.
- 3 Compare and contrast Newtonian and non-Newtonian fluids with appropriate examples
- 4 How does dielectric loss affect microwave heating in food processing? (GATE 2022).
- 5 Define conductivity and resistivity. How are they related? (GATE 2018, 2021)
- 6 Justify how the moisture content influences dielectric constant of cereal grains while microwave drying? (GATE 2024)
- 7 Differentiate between dielectric constant and dielectric loss factor
- 8 Compare and contrast thixotropic and rheopectic fluids with examples from the food industry
- 9 How does viscoelasticity affect the shelf life of bread and dough? (GATE 2019)
- 10 Identify the key difference between Newtonian and Non-Newtonian fluids

Part B

- 1 Explain how the rheological behavior of non-Newtonian foods affects the design of food processing equipment. Support your answer with examples from industry applications.
- 2 Explain the effectiveness of using dielectric properties in determining moisture content in grains during storage.
- 3 Define electrical conductivity (σ) and impedance (Z). How are they used to detect food adulteration? (ii) Honey adulterated with syrup has higher conductivity than pure honey. Justify this observation (GATE 2020 & FSSAI, FDA relevance)
- 4 Analyze the causes and consequences of high electrical impedance in bulk food storage systems.
- 5 Explain the suitability of rheopectic behavior in industrial coatings for food packaging applications.
- 6 Analyze how the rheological behavior of non-Newtonian foods affects the design of food processing equipment. Support your answer with examples from industry applications.
- 7 Evaluate the suitability of rheopectic behavior in industrial coatings for food packaging applications

PART C

- 1 Develop a sensor system for continuous online monitoring of moisture in cereal grains using dielectric properties. Justify electrode choice, signal interpretation, and placement. (GATE 2022)
- 2 Analyze the limitations of using impedance-based sensors for moisture estimation in bulk grain storage (GATE 2019)

- 3 Evaluate the impact of viscoelastic behavior on the machinability of dough in automated food processing lines (GATE 2021)
- 4 Design a hygienic flow system for filling tomato puree
- 5 Evaluate the impact of viscoelastic behavior on the machinability of dough in automated food processing lines (GATE 2021)
- 6 A spice company wants to replace steam pasteurization with RF heating (27 MHz) to retain flavor. The spice mix has $\epsilon_r = 12$, $\tan \delta = 0.3$. i) Calculate power penetration depth (δ) and compare it with microwave heating (2.45 GHz). ii) Design an RF heating protocol (time, power) for 99% microbial reduction. (GATE 2020 & Industry: MDH, Everest)
- 7 Create an experimental protocol using viscoelasticity testing to enhance cookie dough texture and machinability. Define parameters, methods, and link to product quality. (GATE 2018; Industry: ITC)