



Department of Nutrition and Food Engineering
Faculty of Health and Life Sciences
BSc. in Nutrition and Food Engineering
Midterm Examination Spring 2026

Course Code: 0721-3111

Course Title: Food Preservation and Storage Engineering

Level and Term: L-3, T-2

Section: 241 All

Course Teacher Initials: MMM/MNR/MSI

Time: 1 hour 30 minutes

Total Marks: 25

Maintaining the order of the questions is highly appreciated

1. a) What do mean by food preservation? [CLO1,PLO1,C1] 1
- b) Explain the concept of a moisture sorption isotherm and describe its significance in food preservation. [CLO1,PLO1,C2] 2
- c) Convert the following moisture content, [CLO1,PLO1,C2] 2
 - i) 78% wet basis to dry basis & ii) 30% dry basis to wet basis.
2. a) Construct a drying curve and assess how each drying stage affects the efficiency of a drying process. [CLO1,PLO1,C5] 2
- b) Apple juice is being concentrated in a natural-circulation single-effect evaporator. At steady-state conditions, dilute juice is the feed introduced at a rate of 0.67 kg/s. The concentration of the dilute juice is 11% total solids. The juice is concentrated to 75% total solids. Calculate the rate of production of juice concentrate and how much water should evaporate? [CLO1,PLO1,C5] 3
3. a) Construct a freezing diagram for water and a food material. [CLO1,PLO1,C3] 2
- b) A spherical food product is being frozen in an air-blast freezer. The initial product temperature is 15°C and the cold air -35°C. The product has a 5 cm diameter with density of 1000 kg/m³ the initial freezing temperature is -2.15°C the thermal conductivity of the frozen product is 1.2 W/mK and the latent heat of fusion is 250 kJ/kg. If the convective heat transfer coefficient is 45 W/m²K, estimate the freezing time. [CLO1,PLO1,C3] 3

[Please turn over]



- | | | | |
|-------|--|----------------|---|
| 4. a) | Define water activity with an equation. | [CLO1,PLO1,C2] | 1 |
| b) | Onions with 85% moisture content on wet basis is dried to a final moisture content of 10%. If we dry 200kg of onions, what is the final weight of the product and how much water is removed? | [CLO1,PLO1,C4] | 2 |
| c) | List the advantages of supercritical fluid (SCF) extraction. | [CLO1,PLO1,C1] | 2 |
| 5. a) | Draw a typical figure of single screw extruder. | [CLO2,PLO1,C1] | 2 |
| b) | Analyze the effect of extrusion on the physicochemical properties of food products. | [CLO2,PLO1,C4] | 3 |