



KERALA AGRICULTURAL UNIVERSITY
B.Tech. (Food Engg) 2019 Admission
IV Semester Final Examination- -November 2021

Fden.2207

Unit Operations in Food Engineering (2+1)

Marks: 50
Time: 2 hours
(10x1=10)

I Choose the Correct Answer.

1. When you concentrate orange juice by boiling off the excess water, the unit operation in the process is known as:
 - a) Distillation
 - b) Evaporation
 - c) Drying
 - d) Crystallization
2. Sedimentation uses which forces to separate particulate material from fluid streams:
 - a) Centrifugal
 - b) Impact
 - c) Abrasive
 - d) Gravitational
3. Filtration is a process for separating:
 - a) Soluble solids from liquids
 - b) Insoluble solids from liquids
 - c) Immiscible liquids from liquids
 - d) None of the above
4. In reverse osmosis, particles size removal range is:
 - a) 0.1 – 10 m
 - b) < 5 nm
 - c) 5 nm – 0.1 mm
 - d) 10 – 50 mm
5. For size reduction, the following method(s) is/are used:
 - a) Cutting
 - b) Crushing
 - c) Compression
 - d) All the above
6. Ribbon blenders are used for:
 - a) Liquid
 - b) Powder
 - c) Dough & paste
 - d) All the above
7. Extraction of soluble constituent from a solid by means of solvent is known as:
 - a) Leaching
 - b) Evaporation
 - c) Distillation
 - d) Sublimation
8. Which of the following processes is used to separate liquids having different boiling points?
 - a) Crystallization
 - b) Fractional distillation
 - c) Evaporation
 - d) Fractional crystallization

9. In food preservation most commonly used irradiation is:
 - a) X-rays
 - b) α - rays
 - c) β - rays
 - d) γ - rays
10. Microwave heating can be used for:
 - a) Baking
 - b) Drying
 - c) Blanching
 - d) All of the above

II Write short notes on ANY FIVE of the following (5x2=10)

1. Define the term "Vapour recompression".
2. A single stage evaporator is to concentrate mango juice from 10% to 60% solids (whole mass basis) under steady state condition. If the feed rate is 60 kg/h, then calculate the rate of production of concentrated mango juice.
3. Write a short note on "Crystallization".
4. What are the applications of infrared radiation in food processing?
5. Write a short note on "Contact equilibrium process".
6. Explain the terms grinding and cutting. Also list out various grinding equipments.
7. List out the benefits of irradiation.

III Answer ANY FIVE of the following. (5x4=20)

1. Derive the equations for constant rate and constant pressure filtration processes.
2. Write in brief about single and multiple effect evaporators.
3. A fat particle of 10 μm diameter having density of 930 kg.m^{-3} is being separated from milk having density of 1030 kg.m^{-3} and viscosity of 1.8×10^{-3} Pa.s. Calculate the rate at which the fat particle would rise.
4. What is the theory of microwave heating? Briefly explain the components of a microwave heater.
5. Explain the following terms:
 - a) Crushing efficiency
 - b) Mixing index
 - c) Distillation
 - d) Electrodialysis
6. Explain various laws of crushing.
7. List out various crystallization equipment and explain agitated batch crystallizer in brief.

IV Write an essay on ANY ONE of the following (1x10=10)

1. What are the advantages of multiple effect evaporators? Explain with neat sketch the various types of multiple effect evaporators.
2. Write about types of extruders and explain different zones in an extruder with a neat sketch.
