KERALA AGRICULTURAL UNIVERSITY
B. Tech. (Agri. Engg.) 2021 Admission
VI Semester Final Examination – June 2024

Fape. 3207

Dairy and Food Engineering (2+1)

Marks: 50
Time: 2 hours

I **Fill in the blanks** (10x1=10)

1. ..... is the principal contributor to sunlight flavor.
2. The membrane filtration level with the smallest pore size (0.0001 – 0.001 μm) is called.....
3. The unit of the dynamic viscosity is .....
4. The constant rate drying period continues till .....is reached.
5. ..... is recommended in order to avoid cream plug formation.
6. The amount of water evaporated by using 1 kg of steam is called .....

State True or False

7. Two-stage method is usually chosen to achieve optimal homogenization efficiency.
8. The solution to be concentrated or fractionated is called permeate.
9. The viscosity of a shear thinning fluid decreases with increasing shear rate and shear thickening fluid increases with increasing shear rate.
10. Rate of evaporation decreases as humidity of surroundings air decreases.

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

1. What are the benefits of using calcium chloride in making cheddar cheese?
2. Write down the different types of feeding system used in a drum dryer.
3. How the density and viscosity of milk affect the milk processing operations?
4. Explain the nano - filtration process.
5. What are the factors considered while planning dairy building?
6. What is aseptic packaging?
7. Discuss about boiling point elevation.

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

1. Explain about the packaging materials for dairy products.
2. Write merits and demerits of HTST method over LTHT method.
3. What are the different membrane modules?
4. Write down the working principle of spray drying with diagram.
5. Explain different components of homogenizer and the working principle.
6. Explain different types of deterioration in food products and their controls in food preservation.
7. Explain the working principle of disc centrifuge with neat sketch.

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

1. Explain the feed flow arrangements for multiple effect evaporators with neat sketch. Write down short note on vapor recompression system.

2. 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. The specific heats of dilute apple juice and concentrate are 3.9 and 2.3 kJ/(kg °C), respectively. The steam pressure is measured to be 304.42 kPa. The inlet feed temperature is 43.3°C. The product inside the evaporator boils at 62.2°C. The overall heat-transfer coefficient is assumed to be 943 W/(m 2 °C). Assume negligible boiling-point elevation. Calculate the mass flow rate of concentrated product, steam requirements, steam economy, and the heat-transfer area.
[From the steam table: Temperature of steam at 304.42 kPa =134°C; Enthalpy for saturated vapor at 134°C = 2725.9 kJ/kg; Enthalpy for saturated liquid at 134°C =563.41 kJ/kg; Enthalpy for saturated vapor at 62.2°C = 2613.4 kJ/kg.]

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