



KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Food Technology) 2021 Admission
V Semester Final Examination – January 2024

Pafe.3127

Food Process Equipment Design (2+1)

Marks: 50
Time: 2 hours

I Fill in the blanks

(10x1=10)

1. is the process of separating solids from suspension in liquid by gravity alone?
2. In belt drives, are placed for smooth operation.
3. LSU dryer is a Type of grain dryer.
4. I.Q.F. stands for
5. Plenum chamber is used for.....

State True or False

6. Two fluids exchange heat with other in opposite direction is perpendicular
7. Sterilization temperature is 121.1°C
8. Extrusion can be seen as an example of a size enlargement process
9. The efficiency of belt conveyor largely depends on idler
10. Screw conveyor consist of a L or H shaped trough

II Write short notes on ANY FIVE of the following

(5x2=10)

1. Extrusion
2. Spray dryer
3. Homogenization
4. Ductility
5. Retort tube
6. Belt conveyor
7. Agitators

III Answer ANY FIVE of the following

(5x4=20)

1. Explain about twin screw extruder with neat diagram.
2. List out the various dryers used in food industry; explain any two types with neat diagram.
3. A liquid food containing 12% total solids is to be concentrated in an evaporator to produce a liquid containing 32% total solid. If mass flow rate of feed is 100kg/hr, then calculate the mass flow rate of water removed and concentrated product produced under steady state condition.
4. Discuss the construction and design of pressure vessels.
5. Explain shell and tube heat exchanger with neat diagram.
6. Discuss about freezing equipment used in the food industry (any two with neat diagram).
7. Discuss about agitators and baffles used in the food industry (any two with neat diagram).

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

1. In a single effect evaporator, orange juice is being concentrated at a steady state condition. The feeding rate of orange juice is 2160 kg/hr with 10% solid. The juice has to be concentrated to 74% total solids. The inlet feed temperature is 42°C while the product boils at 61.5°C inside the evaporator. The specific heats of dilute and thick orange juice are 0.93 and 0.55 kcal/ kg°C respectively. The overall heat transfer coefficient is 808 kcal/m²h°C. Assuming negligible B.P elevation, Calculate the mass flow rate of thick juice, steam required, economy of operation and total heat transfer area. The temperature of saturated steam entering the evaporator is 130°C. The latent heat of vaporization of water at 61.5°C is 625.1 kcal/kg and latent heat of steam at 130°C is 651.01 kcal/kg.
2. Explain in detail about any four types machineries used for material handling and transportation in food industry.
