



**KERALA AGRICULTURAL UNIVERSITY**  
**B.Tech. (Food Engg.)**  
**One-Time Re-examination-January-2018**  
**2014 Admission VII Semester**

Fden.3209

**Food Process Equipment Design and Layout (1+1)**

**Marks: 50**

**Time: 2 hours**

**(10x1=10)**

**I Fill in the Blanks**

- 1 ..... is the process of separating solids from suspension in liquid by gravity alone
- 2 Homogenization divides globules into smaller ones with diameter less than .....micron.
- 3 Economy of multiple effect evaporators is .....
- 4 LSU dryer is a ..... Type of grain dryer.
- 5 I.Q.F. stands for .....
- 6 The most commonly used mixer for heavy pastes and dough is .....
- 7 Specific heat of ice is .....of the specific heat of water.
- 8 In belt drives, .....are placed for smooth operation.
- 9 Plenum chamber is used for.....
- 10 Frozen foods should be kept at a temperature of less than .....°C.

**II Write Short notes on any FIVE of the following**

**(5x2=10)**

- 1 Extrusion
- 2 Spray dryer
- 3 Homogenization
- 4 Sealing machine
- 5 Size reduction laws
- 6 Belt conveyor
- 7 Rubber - roll sheller

**III Answer any FIVE of the following.**

**(5x4=20)**

- 1 Write a note on pulping and extraction equipments.
- 2 Explain in detail about evaporators
- 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.

**PTO**

- 4 Discuss the construction and design of pressure vessels.
- 5 What are the machineries used for the size reduction.
- 6 In a wheat milling experiment it was found that to go grind 4.33 mm sized grains to IS sieve 35 (0.351 mm opening), the power requirement was 8 KW. Calculate the power requirement for milling of wheat by the same mill to IS sieve 15 ( 0.157 mm opening) using (i) Rittinger's law and (ii) Kick's law. Feed rate of milling is 200 kg/hr.
- 7 Discuss the construction and design of pressure vessels.

**IV Answer any ONE of the following (1x10=10)**

- 1 What is plant layout? Draw a typical plant layout with various functional units.
- 2 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/m<sup>2</sup>h°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.

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