KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food . Engg) Degree Programme 2013 Admission
VIth Semester Final Examination- June - 2016

Cat. No: Fden .3209 **Marks: 50.00**

Title: Food process Equipment design and Plant Layout (1+1) **Time: 2 hours**

I Fill up the blanks (10 x 1 =10)

1. Spray dryer uses _____ as the heating medium.
2. In belt drives, _____ are placed for smooth operation.
3. The presence of solutes _____ the boiling point.
4. _____ foods are evaporated in forced convection evaporators.
5. 100% power transmission is not possible in belt drives due to _____
6. _____ freezers are used to produce IQF.
7. Failure of body due to varying loads is called_____.
8. Nucleation process _____ ice crystal formation.
9. Highly viscous foods are evaporated in _____ evaporators.
10. Plenum chamber is used for _____

I Write short notes ANY FIVE (5 x 2 =10)

1. Processing vats
2. Freezers.
3. Baking oven
4. Extrusion
5. Roller dryers.
6. Vacuum packaging.
7. Falling film evaporator.

I. Explain ANY FIVE of the following (5 x 4 =20)

1. Explain the factors to be considered in design of coolers.
2. Write a note on pulping and extraction equipments.
3. Write about the classical and practical layout.
4. What are the machineries used for size reduction.
5. Explain factors to be considered on selection of dryers.
6. Derive an expression for mass and enthalpy balance in double effect evaporator.
7. Discuss the construction and design of pressure vessels.

(PTO)

IV. Write essay on ANY ONE

(1 x 10=10)

1. A rotary counter current dryer is fed with powder material containing 6 % moisture at the rate of 100kg/min and discharges with 2 % moisture content. The air enters at 135° C and leaves at 80°C. The humidity of air being 0.007 kg/kg of dry air. The material enters at 21°C and leaves at 65°C. Neglecting radiation losses, calculate kg_{air} of dry air passing through the dryer and humidity of air leaving the dryer. Specific heat of material , dry air and water vapour are 0.45 ,0.24 and 0.48 respectively.

2. Calculate the steam requirement for double effect forward feed evaporates to concentrate the liquid food from 11% total solids to 50% total solids. The boiling of liquid inside the second effect takes place under vacuum at 70°C. The steam is being supplied to the first effect at 198.5 kPa. The overall heat transfer coefficient in first effect is 1000 W/m^2 °C. In the second effect is 800 W/m^2 °C. The specific heat of liquid food is 3.8, 3, 2.5, kJ/kg °C, respectively at initial, intermediate and final concentrations. Assume the areas of the temperature gradient are equal in each effect.

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