

KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food.Engg) 2013 Admission

IVth Semester Final Examination-June/ July -2015

Cat. No: Fden.2207

Marks:50

Title: Unit operations in Food Engineering (2+1)

Time:2 hours

- I. Fill in the blanks: (10 x 1 = 10)
1. A point where solid, liquid and vapour phase of a substance exist is called _____.
 2. One hundred kg of grain is dried from 18% to 13% (wb). The amount of water removed is _____.
 3. Dimensions of power are _____.
 4. Kg of steam/kg of water vapour removed in an evaporator is called _____.
 5. A fat globule of 4 μ m diameter move upwards at a velocity of 1.06 mm/h, the velocity of fat globule which is twice this size will be _____.
 6. A centrifuge spins a liquid at 23000 rpm. The angular velocity in rad/s= _____.
 7. The power requirement of a homogenizer operating at 220 bar homogenizing pressure for a flow rate of 10000 litres/h is roughly = _____.
 8. Tumbling mixers should be rotated at speeds lower than the _____.
 9. _____ conveyor moves granular material in closed duct by high speed current of air.
 10. Direct electrical heating of food mixtures is achieved by _____ heating.

- II. Write short notes/answers on ANY Five: (5 x 2 = 10)
1. Equilibrium Moisture Content
 2. Hulling efficiency
 3. Screw press
 4. Bucket elevator
 5. Agitators
 6. Nucleation
 7. Nanofiltration

- III. Write short essays on ANY Five of the following: (5 x 4 = 20)
1. Methods to determine moisture content in food
 2. Rittinger's and Kick's Laws
 3. Ball mills
 4. Parboiling of paddy
 5. Multi effect evaporators
 6. Packed tower design
 7. Flash distillation

IV. Write essay on ANY ONE:

(1 x 10 = 10)

1. Grape juice at a rate of 3 kg/s is concentrated in a single effect evaporator from 18% to 23% solids content. Calculate a) the product flow rate, b) the evaporation rate, c) the steam consumption, d) the steam economy, and e) the required heat transfer area of the evaporator if the juice enters the evaporator at 50°C, the juice boils in the evaporator at 50°C, saturated steam at 100°C is used as heating medium, the condensate exits at 100°C, the heat capacity of the juice is 3.7 kJ/kg°C and 3.6 kJ/kg°C at the inlet and the outlet of the evaporator respectively, and the overall heat transfer coefficient is 1500 W/m²°C.

2. A cyclone separator having the following specifications is used to collect particles of specific gravity 1.2.
 - Cyclone diameter = 180 cm
 - Air inlet diameter = 30 cm
 - Separating height = 2.5 of dia. Of inlet
 - Helix pitch = 15°
 - Inlet width = 10 cm
 - Entry particle velocity = 15 m/s

Compute the smallest particle which can be collected. Estimate the pressure drop through the unit.