KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food.Engg) 2012 Admission

IVth Semester Final Examination- July -2014

Cat. No: Fden.2205   **Marks: 80**

Title: Food Process Engineering (2+1)   **Time: 3 hours**

I. Define all the following.   (1×10 = 10)

1. Aseptic packaging
2. Fermentation
3. Triple point of ice
4. Dehydration
5. Water activity
6. Relative humidity
7. Psychrometry
8. Pasteurization
9. Equilibrium moisture content
10. Blanching of food

II. Write short notes on any TEN of the following.   (3×10 = 30)

1. Relationship between water activity and equilibrium moisture.
2. Extrusion cooking of food.
3. Any two EMC equations.
4. Factors affecting drying rate of foods.
5. 'Z' value.
6. Freezing time and Plank's equation.
7. Ohmic heating.
8. Foam mat drying.
9. Bucket elevator.
10. Differentiate between dew point and wet bulb temperatures.
11. Drying curves.
12. Ambient air at 30°C and 65% RH is heated to 70°C to use as drying air in a dryer. Find the RH of heated air and the amount of heat to be supplied for heating per kg of air? Use Psychrometric Chart.

III. Answer any *FIVE* questions.   (5×6 = 30)

1. Describe a fluidised bed dryer with a neat sketch and write its advantages.
2. Calculate the equilibrium moisture content of brinjal seed at relative humidity of 10% and temperature of 50^{0}C using Henderson's equation. Given that constants c is 6.5 X 10^{-6} and n is 1.8. Suppose, the temperature of the environment is increased what will happen to EMC value of seed for the same RH?
3. Explain the working principle of pneumatic conveyor with a schematic diagram. ? What are its limitations? Where do you come across this type of conveyor?
4. Explain different methods of size reduction employed for solid food materials..
5. Write a note on HTST pasteurization method.

6. At 121^0C process temperature, "eight log reduction" of *Clostridium botulinum* having 'Z ̶ value of 9^0C needs a process time of 1.5 minutes. Calculate the process time for the same degree of reduction at 130^0C temperature.

7. Explain the importance of dielectric properties of food.

IV. Answer any *ONE* question. (10×1=10)

1. a) Describe the process of canning food product with an example.

   b) Ten tonnes of paddy initially at 20% (wb) moisture content is to be dried to 14% (wb) moisture content. Calculate the quantum of water to be removed from the paddy during the drying process and what is the final weight of paddy?

2. a) Explain the importance of food freezing and discuss different freezing methods employed for food products?

   b) A 5 cm thick beef steak is frozen in a room maintained at -30^{0}C. The moisture content of the product is 73% and has the density of 90 kg/m^3 & thermal conductivity (frozen) of 1.10 W/m-K. The product has initial freezing temperature of -1.75^{0}C and the movement of air in the freezing room provides a convective heat transfer coefficient of 5 W/m^2 K. Using Plank's equation, estimate the freezing time required.

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