No. of Printed Pages : 3

RDR-011

Ph.D. IN DAIRY SCIENCE AND TECHNOLOGY (PHDDR)

Term-End Examination

00252

June, 2015

RDR-011 : DAIRY AND FOOD ENGINEERING – I

Time : 3 hours *Maximum Marks : 100*

Note : *Attempt any* ***five*** *questions. All questions carry equal marks. Use of Steam Table is allowed (SI units).*

1. What is the principle of spray drying ? Draw a neat sketch of a spray drier with various components. Compare the performance of pressure nozzle atomizer with centrifugal atomizer. *20*

2. (a) Why is plate heat exchanger preferred over shell and tube heat exchanger in the dairy industry ? *10*

(b) What is the principle of working of a scraped surface heat exchanger ? Explain the construction features and performance characteristics. *10*

3. (a) What engineering properties do you require for the design of an evaporator in the dairy industry ? Describe the method of evaluating any three properties. *12*

(b) Explain hardness, adhesiveness, chewiness and gumminess. *8*

4. (a) Classify various mixing equipments for mixing liquids. Explain where propeller, paddle and turbine type impellers are used in the dairy industry. *10*

(b) How do you determine the power consumption of an agitator ? *10*

5. (a) Describe cone plate viscometer for determining the viscosity of non-newtonian fluid. *10*

(b) Explain texture analyser used for measuring textural properties of any semi-solid food. *10*

6. Write short notes on any ***four*** of the following : *4×5=20*

(a) Climbing Film Evaporator

(b) Kelvin Model

(c) Fluidised Bed Drier

(d) Cyclone Separator

(e) Capillary Viscometer

(f) Plate Evaporator

7. Milk of 13% solids is being concentrated in a single effect evaporator with a feed rate of 1500 kg/h at 20°C. The evaporator is being operated at sufficient vacuum to allow the product to evaporate at 70°C while steam is being supplied at 198·5 kPa. The desired concentration of the final product is 50% solids. Compute the steam requirement and steam economy for the process when the condensate is released at 70°C. Specific heat of 13% solid milk is 4·249 kJ/kg K and specific heat of water = 4·186 kJ/kg K. *20*