

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

**Term-End Examination**

**December, 2015**

**RDR-011 : DAIRY AND FOOD ENGINEERING - I**

*Time : 3 hours*

*Maximum Marks : 100*

**Note :** *Attempt any five questions. All questions carry equal marks.*

1. (a) What are various feeding methods in multiple effect evaporator system ? Compare forward feed with backward feed. **10**  
(b) What is the effect of total solids on evaporation rate ? Explain it using Rault's law. **10**
2. (a) Explain constant rate and falling rate period of drying. **10**  
(b) What is the principle of cyclone separator ? Explain the construction features and its working with neat sketch. **10**
3. Explain the design of plate heat exchanger. **20**
4. What is texture analyser ? List out the properties that can be determined using textural analyser. Give their definition and tell how these are determined. **20**

5. Write short notes on **any four** : **5×4=20**
- Maxwell model
  - Falling film evaporator
  - Condenser
  - Scrapped surface heat exchanger
  - Drum drier
  - Agitator in Dairy industry

6. A tube viscometer with 0.267 cm diameter and 0.91 m length was used to obtain the following data **20**

| $\Delta P(10^5 \times \text{Pa})$ | $Q(10^{-4} \times \text{m}^3/\text{s})$ |
|-----------------------------------|-----------------------------------------|
| 1.30                              | 0.91                                    |
| 1.45                              | 2.50                                    |
| 2.56                              | 2.10                                    |
| 1.99                              | 3.20                                    |
| 2.13                              | 5.20                                    |
| 2.41                              | 8.50                                    |
| 2.70                              | 12.49                                   |

Compute flow behaviour index(n) and consistency coefficient(m).

7.
  - Define Reynold number, Power number and Froud number. **4**
  - Draw the diagram of flow patterns in a agitated vessel. **8**
  - How do you estimate the power consumption in agitated vessel ? **8**
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