



Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH(FT)/SEM-5/FT-503/2011-12

2011

FOOD PROCESS ENGINEERING

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

i) Solar dryer is a type of

- | | |
|----------------------|------------------------|
| a) Conduction drying | b) Convectional drying |
| c) Both of these | d) None of these. |

ii) In Extruder, barrel temperature is

- | | |
|---------------------|-----------------------|
| a) primary variable | b) secondary variable |
| c) machine constant | d) none of these. |



- iii) In plate type heat exchangers
- a) only counter current flow is used
 - b) only con current flow is used
 - c) either type of flow may be used
 - d) none of these.
- iv) Shrimps may be dried most efficiently in
- a) Tray dryer
 - b) Freeze dryer
 - c) Fluidized bed dryer
 - d) None of these.
- v) Heat damage may occur in
- a) Drum drying
 - b) Spray drying
 - c) Both of these
 - d) None of these.
- vi) When the inlet hot air temperatures are the same, high rate of evaporation are achieved at the "wet end" in the case of
- a) Counter current system
 - b) Concurrent system
 - c) Both of these
 - d) None of these.



vii) The ratio of the volume of voids to the total volume is called

- a) Void ratio b) Porosity
- c) Bulk density d) Specific gravity.

viii) After freezing, frozen meat appears

- a) Darker in colour b) Lighter in colour
- c) Colourless d) None of these.

ix) The cause of freeze burn is

- a) Rehydration b) Condensation
- c) Dehydration d) All of these.

x) For a given material, the moisture content expressed as wet weight basis

- a) have greater value
- b) have lesser value
- c) have same value-compared to the moisture content expressed as dry weight basis
- d) none of these.

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- xi) Homogenizer can be used
- a) as a reactor in chemical reactions
 - b) to improve the sensory properties of food products
 - c) in the manufacture of enzymes or single cell proteins
 - d) all of these.
- xii) Which is the controlling factor for a drum dryer ?
- a) Diffusion
 - b) Heat transfer
 - c) Both (a) and (b)
 - d) Neither (a) nor (b).

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Discuss with a neat sketch the operating principle, merits & demerits of hydrostatic sterilizer.
3. Explain with sketch the following visual seam defects :

$$1 \frac{1}{2} + 1 \frac{1}{2} + 2$$

- a) Droop
- b) False seam
- c) Sharp seam & Cutover.



4. Explain the following :

- a) Texturized vegetable protein
- b) Function of an extruder
- c) Benefits of extrusion.

5. Explain the following :

$$1 \frac{1}{2} + 2 + 1 \frac{1}{2}$$

- a) Prefabricated cold storage
- b) Heating of milk before homogenization
- c) Basic units of HTST pasteurizer & advantages of plate heat exchanger.

6. Draw a schematic diagram of a falling film evaporator and state its working principle.

$$2 \frac{1}{2} + 2 \frac{1}{2}$$

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

- 7. a) Determine the convective heat transfer co-efficient for a plate heat exchanger with a 6.35×10^{-3} m distance between plates. The product is non-Newtonian with $n = 0.5$ and thermal conductivity $K = 0.52$ W/mC. 10
- b) Which types of food is dried in drum dryer and tray dryer ? Give specific examples. 2 + 3
- 8. Describe high speed horizontal dough mixture. Give labelled diagram.

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9. What do you understand by "Ton of Refrigeration" ? Discuss the factors to be considered for calculating the refrigeration load of a cold store. What is the ideal air distribution system in a cold store with unit coders ?

4 + 6 + 5

10. a) Draw a labelled diagram of a commercial tray type freeze dryer and explain its principle of operation and advantages.

b) Differentiate between conventional drying and freeze drying processes.

12 + 3

11. a) Why evaporation by boiling preserves the liquid food ? Indicate the types of evaporator and their uses. What are the common features of an evaporator ? How energy efficiency of an evaporation system can be increased ?

b) Draw a labelled diagram of a fluidized bed dryer and state its advantages and disadvantages in food processing industries.

(1 + 3 + 2 + 2) + (3 + 4)

12. Write short notes on any *three* of the following :

3 × 5

a) Cold chain

b) Cyclone separator



- c) Cabinet tray dryer
 - d) Drying rate curve & microwave drying
 - e) Continuous pressure sterilizer
 - f) Liquid nitrogen tunnel freezer
 - g) Individual Quick Freezing process.
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