REV-00
BFST/22/28

2017/12

B.SC FOOD SCIENCE & TECHNOLOGY
SEMESTER-3RD
FOOD PROCESS ENGINEERING-II
BFST-307

Duration: 3 Hrs. **Marks: 70**

Part : A (Objective) = 20
Part : B (Descriptive) = 50

[PART-B : Descriptive]

Duration: 2 Hrs. 40 Mins. **Marks: 50**

[Answer question no. One (1) & any four (4) from the rest]

1. Explain the 3 modes of heat transfer with necessary expressions. What is the necessity of heat transfer in food? 7+3=10

2. Explain with diagram the working of Plate Heat Exchanger & Shell & Tube Heat Exchanger. 10

3. Explain in details any of the four materials handling equipments most commonly used in food industries. 10

4. Define the terms – (a) D- value, (b) Z-value, (c) Black body, (d) Grey body 10

5. Define evaporation. Show with labeled diagram the difference between single effect & multiple effect evaporator. Write down four advantages of evaporation in food industries. 2+6+2=10

6. Define thawing. A cold storage plant is required to store 25 tones of apple. The following data are given: Initial temperature of apples=30°C, refrigerator storage temperature=2°C, sp heat of apples above freezing point = 0.87 kcal/kg°C . If cooling is achieved within 8 hrs. determine – 10
   a) Capacity of the refrigeration plant.
   b) COP of carnot cycle between the temperature range.
   c) If actual COP is 25% of carnot, find out horse power required to run the plant.

7. Jot down the necessity of heat exchangers in during food processing. Calculate the required heat exchanger area for parallel as well as counter flow arrangements, if 600 kg/hr of water is cooled from 80°C to 50°C by means of flow rate of cooled water at 10°C and at 900 kg/hr. Assume the overall heat transfer coefficients to be 500 k cal/m^2-hr-°C and specific heat of water 1 k cal/kg°C. 2+8=10

8. Write down the expressions for conduction through 'a pipe' and through 'a hollow sphere'. A 5m high and 12m long composite wall of a cold storage is made up of 100 mm thick brick wall as the outside wall. The inner wall surface is of fibre glass of 60mm thick. In between the two walls an insulating board of 20mm thickness is placed. The coefficients of thermal conductivity for the three layers are given below: 2+8=10

Brick wall=1.15W/m-K
Fibre glass=0.04 W/m-K
Insulating board=0.06 W/m-K

If the outside atmospheric temperature is 27°C and cold room temperature is 8°C. Calculate the heat loss per hour through the wall. Also determine the interface temperatures.

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[PART-A : Objective]

Choose the correct answer from the following : **1X20=20**

1. A relatively mild heat treatment in which food is heated to below 100°C –
   a. Sterilization
   b. Pasteurization
   c. Radicidation
   d. None

2. The main purpose of pasteurization of fruit juice is –
   a. Improve color
   b. Improve taste
   c. Inactivation of enzymes
   d. Both (b) and (c)

3. Pasteurization of milk is done to remove –
   a. Saccharomyces carbajali
   b. Coxiella burnettiib
   c. Lactobacillus spp.
   d. Both (b) and (c)

4. Generally milk is pasteurized at 71.5°C for –
   a. 15 s
   b. 1 min
   c. 20 s
   d. 50 s

5. The length of time required to sterilize a food is influenced by –
   a. Heating conditions
   b. pH of foods
   c. physical state of food
   d. All

6. The factors that influence heat resistance of micro organisms or enzymes & their characteristics by –
   a. D-value
   b. Z-value
   c. Both (a) and (b)
   d. Chemical structure

7. Heat penetration to centre is faster in _____ containers than in _____ containers.
   a. Large, small
   b. Small, large
   c. Square, circular
   d. None

8. Which of the following operation is used to pre concentrate liquid foods? –
   a. Evaporation
   b. Dehydration
   c. Pasteurization
   d. None

9. Which of the following is more expensive in energy consumption than other methods of concentration?
   a. Evaporation
   b. Concentration
   c. Pasteurization
   d. None

10. During evaporation _____ heat is transferred from steam to the food, to raise the temperature of its boiling point.
    a. Latent heat
    b. Sensible heat
    c. Critical heat
    d. All

11. Advantage(s) of correct material handling –
    a. Saving in storage & operation space
    b. Better stock control
    c. Improved product quality
    d. All

12. Which of the following conveyers are used for movement of bulk containers –
    a. Flat belt conveyor
    b. Roller conveyor
    c. Chain conveyor
    d. Pneumatic conveyor

13. The density of materials changes with –
    a. Time
    b. Temperature
    c. Weight
    d. Viscosity

14. The force that moves a liquid is known as –
    a. Shear stress
    b. Shear rate
    c. Stress rate
    d. None

15. In which of the following type of fluid the viscosity decreases as the shear rate increases?
    a. Pseudoplastic fluid
    b. Dilalant fluid
    c. Bingham
    d. None

16. Cold storage temperature should be—
    a. Above 4°C
    b. Below 4°C
    c. Both a and b
    d. None

17. For grain conveying in belt convoyer belt speed of _____ is recommended.
    a. 0.5 – 1 m/s
    b. 2.0 – 2.5 m/s
    c. 2.5 – 2.8 m/s
    d. None

18. In belt conveyor, a trough angle of _____ is best suited for paddy & other grains.
    a. 20°
    b. 25°
    c. 30°
    d. None

19. CFC stands for –
    a. Chloro fluoro carbon
    b. Chloro floride carbon
    c. Chloro florate carbon
    d. None

20. Which of the following is true?
    a. Radiation does not need any medium between two bodies
    b. Radiation needs a medium between two bodies
    c. Radiation needs a solid surface between two bodies
    d. None

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UNIVERSITY OF SCIENCE & TECHNOLOGY, MEGHALAYA

[PART (A) : OBJECTIVE]

Duration : 20 Minutes

Serial no. of the main Answer sheet

Course : .....

Semester : ..... **Roll No :** .....

Enrollment No : ..... **Course code :** .....

Course Title : .....

Session : 2017-18 **Date :** .....

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Instructions / Guidelines

- The paper contains twenty (20) / ten (10) questions.
- Students shall tick (✓) the correct answer.
- No marks shall be given for overwrite / erasing.
- Students have to submit the Objective Part (Part-A) to the invigilator just after completion of the allotted time from the starting of examination.

Full Marks	Marks Obtained
20	

Scrutinizer's Signature *Examiner's Signature* *Invigilator's Signature*