B.E. FOOD TECHNOLOGY AND BIO-CHEMICAL ENGINEERING SECOND YEAR FIRST SEMESTER - 2019

PRINCIPLES OF FOOD PRESERVATION

Time: Three Hours   Full Marks: 100

Use Separate Answer scripts for each part

Different parts of the same question should be answered together
Part-I
Full Marks-50

Answer question 1 and any two from the rest

1. Explain the following: 4x5

a) exhausting before can sealing.

b) effect of dehydration on quality of food products.

c) fermentation and putrefaction

d) stationary and falling rate period of dehydration process.

2a) Differentiate between:

   i) critical moisture content and equilibrium moisture content,

   ii) F-value and Z-value

   iii) relative humidity and absolute humidity

 b) Comment on:

   i) Can size of 401x404

   ii) salt concentration of 10 degree salometer

c) A food product contains 20% moisture on wet basis. What will be the moisture content on dry basis?   7.5+(2.5+2)+3

[Turn over

3.a) What is Osmotic dehydration? Explain the factors which affect the Osmotic dehydration process.

b) State and explain the problems in pickle making.   10+5

4. Write short notes on (any 3):   3x5

a) Filling liquid for canning of fruits and vegetables.

b) dehydration of food materials by Tunnel drier.

c) spoilage of canned foods.

d) major moisture transfer within the solid during dehydration.

B.E (FTBE) SECOND YEAR, FIRST SEMESTER EXAMINATION 2019

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PART- II (50 MARKS)

USE SEPARATE ANSWER SCRIPT FOR EACH PART

Q1. Answer either (a) or (b) in this block.

(a) Describe the following (any 1): $2 \times 2.5 = 5$

   I.   Multiple roles of citric acid as a food additive.
  II.   Heat removal during freezing of foods (with the aid of graph).

(b) Define the following: $5 \times 1 = 5$

   I.   Humectants
  II.   Fortification
 III. T_E
 IV.   Bacteriocins
  V. T_g

Q2. Differentiate between (any 2): $2 \times 5 = 10$

  a. Energy requirements in Radappertization and Radpasteurization
  b. Flavoring agents and Flavor enhancing agents
  c. Direct Food Additives and Indirect Food Additives
  d. Homogenous and Heterogeneous nucleation

Q3. Answer any two from (a), (b) and (c) in this block.   5 + 5 = 10

(a) Explain why heat transfer, and not mass transfer limits rate of crystallization during freezing. Explain graphically why enzymatic degradation changes are dominant during supercooling.

(b) Enumerate the factors to be considered in selecting an acidulant for use in food products (provide appropriate examples). Explain why there are concerns in long-term usage of PET bottles for drinking water.

(c) Explain the advantages of gamma processing of foods. Provide technical specifications of Co-60 source used for industrial scale gamma processing of foods.

Q4. Answer any one from (a) and (b) in this block.   5

(a) Diagrammatically illustrate the effects of initial concentration on decrease of volume and increase in molality of unfrozen phase in a food product.

(b) Illustrate graphically the changes that occur in cooking quality of rice due to gamma irradiation.

Q5. Answer any two from (a), (b) and (c) in this block.   10 + 10 = 20

(a) A worker receives uniform whole-body dose of 8. mGy from γ-rays and 1.2 mGy from 100 keV neutrons (w_R = 10). What is the effective dose received by this worker? How does it differ from equivalent dose? Evaluate the strategies/measures you would adopt for radiation hazard control in a gamma radiation facility.

(b) Critically analyze the causes and the changes a food product undergoes during quick freezing vis-à-vis slow freezing. Explain how addition of maltodextrin enhances storage temperature of ice cream.

(c) The given table shows data on changes in firmness (measured in kg) of diced Roma tomatoes with different doses (kGy) of γ-irradiation and progression of storage time (days) at 4°C. Critically analyze the data and recommend dose of γ-irradiation to be used and assess the shelf life of the tomatoes. Why does γ-irradiation cause textural changes in tomatoes?

Gamma Irradiation and Firmness (kg) of Diced Roma Tomatoes Stored at 4°C for 15 days				
Day	Irradiation dose (kGy)			
	0.0	0.50	1.24	3.70
0	14.53 ± 0.92	10.26 ± 1.12	8.87 ± 1.62	7.60 ± 0.61
3	13.48 ± 1.46	11.33 ± 0.69	10.24 ± 1.06	8.45 ± 0.56
6	13.93 ± 2.42	13.30 ± 1.63	11.03 ± 0.72	8.51 ± 0.23
9	13.13 ± 1.13	11.06 ± 1.25	9.91 ± 1.21	6.99 ± 0.66
12	14.62 ± 1.95	12.91 ± 1.07	8.81 ± 0.32	7.58 ± 0.45
15	13.22 ± 1.56	11.16 ± 1.12	9.33 ± 1.18	6.80 ± 1.30