

Tribhuvan University
Institute of Science and Technology
Model Question, 2082

B.Tech. Food/ II Year /IV Semester/ Science
Workshop Technology [BFT 251(A)]

Full Marks: 30
Pass Marks: 12
Time: 2 hours

Candidates are required to give their answer in their own words as far as practicable. The figure in the margin indicates full mark

Group A

Long Answer Questions. Attempt any TWO questions.

[2 x 6=12]

1. Evaluate the use of non-metals (plastics, glass, and wood) in the food industry. Discuss their structural properties, advantages, and limitations concerning food safety and sanitation. [6]
2. Describe how the following lathe operations are used to repair a damaged rotary shaft of a liquid food blender. (a). Turning and facing (b). Taper turning and threading [3+3]
3. Discuss the concept of hygienic (sanitary) welding in food processing plants. Explain how a weld's inner root profile can impact CIP (Clean-in-Place) efficiency and bacterial contamination risks. [2+4]

Group B

Short Answer Questions. Attempt any Six questions.

[6 x 3 = 18]

4. What is the primary purpose of a try square when checking workshop components or food processing frames? [3]
5. What is the primary role of workshop technology in food processing industries? [3]
6. What is the function of a bench vice in a workshop, and how can you protect a soft food-grade material from its jaws? [3]
7. Differentiate between a "hem" and a "seam" in sheet metal operations. [3]
8. What is the primary objective of repair and maintenance in a food processing plant? [3]
9. Explain the main function of a "union" fitting in a fluid pipeline, and how it helps during maintenance compared to a fixed coupling. [3]
10. What is the purpose of the "planing" operation, and how does it improve the safety of wooden pallets used for transporting bagged ingredients? [3]
11. What is the primary difference in the cutting motion between a shaper and a planer machine? [3]

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Model Question, 2082

B.Tech. Food/ II Year /IV Semester/ Science
(Cereals, Legumes and Oilseeds Technology [BFT 252(A)])

Full Marks: 30
Pass Marks: 12
Time: 2 hours

Candidates are required to give their answer in their own words as far as practicable. The figure in the margin indicates full mark

Group A

Long Answer Questions Attempt any TWO questions.

[2 x 6 =12]

1. Describe the technological process for the milling of wheat grain. [6]
2. What is degree of milling? Explain the modern rice milling process with flow- chart in detail.
[1+5]
3. Discuss the role of basic ingredients in bread making. Give the self-explanatory flow-chart of corn grits making process.
[2+4]

Group B

Short answer questions. Attempt any SIX questions.

[6×3=18]

4. Explain briefly, the physical properties of grain. Explain the measuring process of bulk-density in your lab.
[1.5+1.5]
5. What is gluten? Write about nutritional distribution in wheat grain with neat & clean structure.
[1+2]
6. What is malt? Describe flow chart for making malt.
[1+2]
7. Explain basic raw materials of cake making. Give a self- explanatory process of muffin method of cake making.
[1.5+1.5]
8. Give an account of anti-nutritional factors present in legumes along with their remedy. [3]
9. Write short note on Alveograph or extensograph. [3]
10. What is the basic concept of parboiling? Write down the modern process of parboiling. [1+2]
11. Differentiate between protein concentrate and protein isolate. Write the different methods of oil extraction.
[1+2]

TRIBHUVAN UNIVERSITY

Model Question 2083

B. Tech (Food)/Semester IV/Science & Technology

Industrial Microbiology – I (BFT 253A)

Full Marks: 30

Pass Marks: 12

Time: 2 hours

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

The figures in the margin indicate full marks.

Long Answer Questions

Attempt any **TWO** questions.

[2×6=12]

1. What is a fermentation process scale-up? What are the major scale-up parameters/criteria of fermentation process scale-up? List the stress factors encountered by cells in fermentation. [2+3+1]
2. What is genetic engineering? Give the working principle of overproduction of primary metabolites by auxotrophic and analog-resistant mutants? How do simple media differ from complex media? [1.5+3+1.5]
3. Why is media optimization necessary for a fermentation industry? Define and give an example of medium optimization by OFAT approach. Define design of experiment (DoE). [1.5+3+1.5]

Short Answer Questions

Attempt any **SIX** questions.

[6×3=18]

4. Illustrate the concept of microbial cell as a factory in miniature, supporting the concept with some relevant examples. [3]
5. What is TCA cycle? What are its significance? [1+2]
6. Compare aerobic and anaerobic fermentation with respect to energy yield and product formation. [3]

7. Define fermentation. List the characteristics of aerobic fermentation and anaerobic fermentation. [1+2]
8. Define microbiological assay. Why is microbiological assay important? [1.5+1.5]
9. Describe dry-heat sterilization of an object/item. [3]
10. What is filter sterilization and why is it important? [3]
11. Discuss the important properties of agar that make it uniquely suitable for culturing microorganisms. [3]

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B.Tech. Food/ II Year /IV Semester/ Science
Food Engineering-II [BFT 254(A)]

Full Marks: 30
Pass Marks: 12
Time: 2 hours

Candidates are required to give their answer in their own words as far as practicable. The figure in the margin indicates full mark

Group A

Long Answer Questions. Attempt any TWO questions.

[6×2=12]

1. Select a suitable evaporator for concentrating fruit juices and explain its working in detail with specifications. Calculate the steam consumption in a single effect evaporator 25 m² heat transfer area which is being used to concentrate a fruit juice. The juice entering the evaporator is at 31.19 kPa; saturated steam at 100°C is used as the heating medium; the condensate exits at 95°C; and the overall heat transfer coefficient is 1500 W/m²°C. [3+3]
2. Describe with application working of plate and frame filter press. What are filter aids? A plate-and-frame filter press is used to filter an apple juice suspension at a constant pressure. During a trial run, it is observed that 0.05 m³ of filtrate is collected in 100 seconds, and 0.10 m³ of filtrate is collected in 320 seconds (total time from the start). Assuming incompressible cake filtration and negligible filter medium resistance, calculate:
 - a. The constant representing the filtration rate.
 - b. The time required to collect a total volume of 0.20 m³ of apple juice filtrate. [2+1+3]
3. Outline general characteristics of ideal and non-ideal solutions. A continuous distillation column separates a benzene-toluene mixture. The feed contains **40 mol% benzene** and **60 mol% toluene**. The process must yield a distillate with **95 mol% benzene** and bottoms with **5 mol% benzene**. The feed enters as a **saturated liquid** at its boiling point. The column operates at a **reflux ratio of 2.0**. The relative volatility (α) of benzene is **2.5**. Determine number of trays using McCabe Thiele method. [3+3]

Group B

Short Questions Answer. Attempt any SIX questions.

[6 × 3 = 18]

4. State Duhring's rule. Briefly list the functions of ferrule, calandria, and vapor recompressor. [1+2]
5. Define hindered settling. Explain, with specifications, the working of a disc bowl centrifuge. [1+2]
6. What is mixing index? Describe the theory of liquid-liquid mixing. [1+2]
7. Derive the drying rate equation for non-hygroscopic food materials. Define Critical Moisture Content. [2 + 1]
8. A 20 weight % solution of Na₂SO₄ at 200°F is pumped continuously to a vacuum crystallizer from which the magma is pumped at 60°F. What is the composition of this magma, and what percentage of Na₂SO₄ in the feed is recovered as Na₂SO₄·10H₂O crystals after this magma is centrifuged? Basis: 100 kg feed [3]

Temp. °C	10	15	20
Solubility of Na ₂ SO ₄ ·10H ₂ O (g/100 g H ₂ O)	9.0	19.4	40.8
9. It is found that the energy required to reduce particles from a mean diameter of 1 cm to 0.3 cm is 11 kJ kg⁻¹. Estimate the energy requirement to reduce the same particles from a diameter of 0.1 cm to 0.01 cm, assuming:
(a) Kick's Law, (b) Rittinger's Law, (c) Bond's Equation [3]
10. Define reflux ratio. Derive equation to calculate number of trays for enriching section. [1+2]
11. How electrodialysis filter operates? Point out important components of RO. [2 + 1]

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B.Tech. Food/ II Year /IV Semester/ Science
Food Quality Control and Standards [BFT 255(A)]

Full Marks: 30
Pass Marks: 12
Time: 2 hours

Candidates are required to give their answer in their own words as far as practicable. The figure in the margin indicates full mark

Group A

Long Answer Questions. Attempt any TWO questions.

[2 x 6 =12]

1. What are the objectives of food rules and regulations? Point out the common features of Nepalese food law and also mention its shortcomings. [2+4]
2. Define HACCP. Correlate and describe the importance of some prerequisite programs (GAP, GMP, and GHP) for the success of HACCP. Why is CCP important? [1+4+1]
3. Difference between quality control and quality assurance? Explain the major functions of the quality assurance department in maintaining quality in food products. [2+4]

Group B

Short Answer Questions: Attempt any SIX questions.

[6×3 =18]

4. What is food quality perception? How does food product quality affect perceived food quality? [1+2]
5. What is meant by food quality audit? Mention the role of a first-party auditor in the food industry. [1+2]
6. Describe the different food standard systems briefly. Explain the formulation process of food standards in Nepal. [1+2]
7. Define food quality attributes. Describe briefly intrinsic and extrinsic quality attributes of food. [0.5+2.5]
8. What is artificial intelligence? Discuss the possible application of AI in food quality control. [1+2]
9. List out different sources of food toxicants. What is the importance of food toxicology in food safety? [1.5+1.5]
10. What is the Codex Alimentarius Commission? Write the general process of Codex standard establishment. [1+2]
11. What is statistical process control (SPC)? What are the most applicable statistical tools in quality control? [0.5+2.5]

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B.Tech. Food/ II Year /IV Semester/ Science
[Food Analysis BFT 256(A)]

Full Marks: 45
Pass Marks: 18
Time: 2 hours

Candidates are required to give their answer in their own words as far as practicable. The figure in the margin indicates full mark

Group A

Long Answer Questions. Attempt any TWO questions.

[2 x 10.5=21]

1. Discuss the volumetric titration method and gas chromatographic method for the determination of benzoic acid in food. Highlight the principles and procedure of volumetric titration method if tomato ketchup is provided as a sample. **[3+2+5.5]**
2. Give the concept of acceptance sampling. Discuss the types of risks associated with sampling (producer's risk and consumer's risk). What are the principles of attribute sampling and variable sampling, highlighting their applications in food quality control? **[1.5+4.5+4.5]**
3. Explain the concepts of chlorine demand, chlorine dose, and residual chlorine in water chlorination. How is the breakpoint chlorination curve used to determine the optimal chlorine dose? Discuss the factors affecting chlorine demand and the importance of maintaining residual chlorine in distribution systems. **[3+3+4]**

Group 'B'

Short Answer Questions. Attempt any SIX Questions

[6 x 4 =24]

4. Outline the step-by-step procedure for determining vitamin C in fruit juice using the 2,6-dichloroindophenol (DCIP) titration method. Include sample preparation, standardization of dye, titration, and calculation of ascorbic acid content. **[4]**
5. Discuss the applications of electrochemical biosensors in detecting microbial pathogens, toxins, pesticides, and heavy metals in food. **[4]**
6. Outline the three major steps in food analysis: (i) select and prepare sample, (ii) perform the assay, and (iii) calculate and interpret the results. Why is each step critical for obtaining reliable data? **[4]**
7. What is freeze-drying, and how does it differ from conventional drying methods? List out its advantages and disadvantages for moisture determination in heat-sensitive and high-sugar foods. **[4]**
8. Outline the step-by-step procedure for the Kjeldahl method, including digestion, distillation, and titration. What reagents and catalysts are used, and how is the nitrogen content calculated? **[4]**
9. Give the color formation reaction in the phenol-sulfuric acid method. How do furfural and hydroxymethyl furfural react with phenol to produce a yellow-gold colored complex, and at what wavelength is absorbance measured? **[4]**
10. Write the principle of the wet ashing (wet digestion) method. How do strong acids (e.g., HNO_3 , H_2SO_4 , HClO_4) and oxidizing agents solubilize organic matter and release minerals into solution? **[4]**
11. Describe the principle of the Goldfish method for continuous solvent extraction. Why is this method faster than the Soxhlet method? **[4]**