

Chittagong Veterinary and Animal Sciences University  
MS in Food Processing and Engineering  
January-June Semester 2018 Final Exam  
**Course Title: Food Additives, Contaminants and Toxicology**  
**Course code: FCT- 501**

Total Marks: 40

Time: 2 hour

**Answer any four (04) questions. Figures in the right margin indicate full marks.**

1. a. Classify food additives. Briefly describe the need and permitted dosages of additives. 2+3=5  
b. Define antimicrobial agents. Explain the mode of action and their application. 1+4=5
2. a. Enlist synthetic and natural antioxidants. Discuss the mechanism of oxidation inhibition of antioxidants. 2+4=6  
b. Briefly describe the color extraction techniques. 04
3. a. Discuss the agricultural and industrial contaminants in foods. 05  
b. Give an overview about the pesticides residues in fruits and vegetables. 05
4. a. Give an outline about the toxic constituents and anti-nutritional factors of plant foods. 06  
b. Briefly describe the determinants of toxins in foods. 04
5. Write short note on the followings: 2.5x4=10
  - a) Flavor encapsulation
  - b) Nutritive and non-nutritive sweeteners
  - c) Food allergy and Food intolerance
  - d) Dietary estrogens and antiestrogens

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**Course Title: Advanced Food and Industrial Microbiology**  
**Course code: AFM- 501**

Total Marks: 40

Time: 2 hour

**Answer any four (04) questions. Figures in the right margin indicate full marks.**

1. a. Explain primary and secondary metabolite of a bacterium. Give some examples of it mentioning the name of bacteria and its use in industrial microbiology. 2+3=5  
b. Briefly describe the mechanism of different types of fermenters based on the mode of operation. 05
2. a. Analyze the principles of food preservation and describe the factors influencing the growth of microorganisms in meat. 2+4=6  
b. Explain the factors influencing the kind and rate of spoilage of fish and mention the evidences of fish spoilage. 04
3. a. Assess the properties of antimicrobial food preservatives and distinguish chemical food preservatives with their maximum tolerances in which organisms affected in foods. 05  
b. Give an overview of the commercial production of Baker's Yeast. 05
4. a. Illustrate biosynthesis of lactic acid and its recovery and purification with industrial application. 05  
b. Enlist different enzymes which are used on carbohydrate compounds and their industrial applications. 05
5. a. What are the different classes of biosafety cabinet? Mention the salient features of BSC II and BSC III. 2+3=5  
b. Describe upstream and downstream processing for the commercial production of citric acid. 05

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**Course Title: Advanced Dairy Engineering**  
**Course code: ADE- 501**

Total Marks: 40

Time: 2 hour

**Answer any four (04) questions. Figures in the right margin indicate full marks.**

1. a. Define Dairy Engineering. Briefly describe the engineering properties of milk and milk products. 1+5=6
- b. Give an overview about the maintenance of dairy plant? 04
2. a. Discuss the application of milk separators, pasteurizer and milk homogenizer. 06
- b. Explain the types of dairy detergents and sanitizers. 04
3. a. Define fermented dairy products. Discuss the processing techniques of fermented dairy products? 05
- b. Explain aseptic processing techniques of milk and milk products? 05
4. a. Give an overview about the physico-chemical properties of milk and milk products. 05
- b. Assess the prospect of the applications of enzymes in dairy industry. 05
5. a. Give an overview about the present trends in cleaning and sanitization in dairy plants? 05
- b. Briefly describe the types of dairy waste from different sections? 05

**Chittagong Veterinary and Animal Sciences University**  
MS in Food Processing and Engineering Final Examination  
January- June Semester, 2018

**Course Title: Novel Separation Techniques**

**Course Code: NST- 501**

Full mark: 40, Time: 2 hours

**Answer any four (4) questions. Figures in the right margin indicate full marks. split answer is not allowed.**

1. a. Enumerate in brief the principle and techniques of zone refining with application. 4  
b. Explain the principle of following terms: i) Ion-exchange chromatography, 6  
ii) Electrophoresis,  
iii) Affinity chromatography.
2. a. Differentiate between physisorption and Chemisorption. Briefly describe the 6  
factors influencing adsorption.  
b. Define thermal separation. Differentiate the major thermal separation process 4  
between: i) adsorption & absorption,  
ii) adsorption & desorption.
3. a. Explain in brief the following terms : i) pervaporation, 5  
ii) vapour permeation techniques.  
b. Enumerate in brief the principle of membrane separation. Mention the general 5  
consideration of membrane choice.
4. a. Write down the types of filtrations based on retentate and pore size. Describe the 6  
principle of cross flow filtration.  
b. Discuss the mechanism of filtration. 4
5. a. Give a brief outline in recently advance novel separation techniques. 4  
b. Write down the following terms (any three) :i) Reverse osmosis, 6  
ii) Super Critical fluid extraction,  
iii) Crystallization,  
iv) Immuno chromatography.

**Chittagong Veterinary and Animal Sciences University**  
MS in Food Processing and Engineering Final Examination  
January- June Semester, 2018

**Course Title: Food Machinery Design**

**Course Code: FMD- 501**

Full mark: 40, Time: 2 hours

**Answer any four (4) questions. Figures in the right margin indicate full marks. Split answer is not allowed.**

1. a. Show the steps of Engineering Design Process. Give a brief outline of Engineering properties of Food Materials. 6  
b. Define vessel and how it could be classify? Show the different parts of vessels. 4
2. a. Mention different design considerations which are used in piping system. 5  
Completely design a food storage tank.  
b. Differentiate between Recuperative and Regenerative heat exchanger. Illustrate the general design considerations of Heat Exchanger. 5
3. a. Describe in brief the seed processing steps and machineries/ equipment involved in processing steps. 5  
b. Define size reduction. List and explain the factors affecting in size reduction of material. 5
4. a. Write down the major objectives of size reduction. Explain the following terms: 6  
i) Compression, ii) Impact, and iii) Attrition.  
b. How corrosion can be controlled by electropolishing and passivation? 4
5. a. Enumerate in brief the types of Evaporator and their design consideration factors. 5  
b. Give a brief outline of Input and Output Devices of Programmable logic Controller system. Write the design consideration factors of a dryer. 5

**Chittagong Veterinary and Animal Sciences University**

Department of Food Processing and Engineering

MS in Food Processing and Engineering Final Examination

Semester: January-June, 2018

Course Title: **Computation and Modeling in Food Industry**

Course Code: CMF-501

Full Marks: 40 Time: 2 hours

**Answer any (5) questions. Figures in the right margin indicate full marks. Split answer is not allowed.**

- 1 a. What is model? Write down the various dimensions of a model. How model development process done? 4
- b. What characteristics of food and bioprocesses has potential impact on modeling? Classify modeling of food and bioprocesses. 4
- 2 a. Briefly describe different physics-based and observation-based models. 4
- b. Is Monte Carlo simulation is a probabilistic modeling tool? Explain. Write down the applications of Monte Carlo simulation in food and bioprocess engineering. 4
- 3 a. List of dimensionless numbers that are frequently used in modeling or correlating mass, heat, and momentum transport processes. Write down the applications of Dimensional Analysis (DA) related to food processing. 4
- b. Briefly describe the selection criteria of food processing equipment design and modelling. 4
- 4 a. What are kinetic models? Design thermal processing of food with kinetic models. 4
- b. Which model is used to predict temperature distribution histories within a food product structure? Estimate the density of tomato puree at 30°C, based on following composition of the product. 4

Water	87.88 g/100 g
Protein	1.65
Total Lipids	0.21
Carbohydrate	7.08
Fiber	1.9
Ash	1.28

- 5 a. What are important considerations of process design models? Describe general approaches to preservation process design. 4
- b. A new liquid product is processed to ensure shelf stability by using a HTST process. The rate constant for the spoilage microorganism is 0.3/min at 100°C, and the activation energy constant is 250kJ/mole. The most temperature-sensitive quality attribute has a rate constant of 0.1/min at 120°C and an activation energy constant of 100kJ/mole. The process is based on an acceptable spoilage rate of 1 container per 10 million processed 4

and packaged, and the initial population is 1000 per container. Determine the improvements in quality retention to be achieved by using a process temperature of 115°C as compared to 100°C.

- 6 a. Why improvement of designing processes is needed in future? What opportunities has potential for evolving process technologies? 4
- b. How you design a food plant with concept of computation and modeling in food industry? 4