

**Chittagong Veterinary and Animal Sciences University**  
**Department of Applied Chemistry and Chemical Technology**  
**M.S. in Food Chemistry & Quality Assurance (January-June, 2017)**  
**Subject: Food Quality Management**  
**Course Code: FQM-501**

**Full Marks: 40**

**Time: 02 hours**

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

1. a) What do you mean by food safety management system? Discuss about the general requirement of these system. 6
- b) Write the responsibilities of food safety team leader. 4
2. a) How external & internal communication help in maintaining food safety according to ISO 22000:2005? 4
- b) Why characterization of raw materials, ingredients and end products are necessary to ensure HACCP? 6
3. a) How verification & documentation programs are implemented in HACCP systems? 4
- b) What are the key points need to be considered to facilitate HACCP plan? 6
4. a) What is ISO 22000? Is HACCP system need to be implemented to ensure ISO 22000? Discuss with your opinion. 4
- b) How food industries can meet compliance of ISO 22000? 6
5. a) Write the differences between GLP & GMP. 4
- b) How you can determine CCPs? 3
- c) Write short notes on PRP & food safety hazards. 3

**Chittagong Veterinary and Animal Sciences University**  
**Department of Applied Chemistry and Chemical Technology**  
**M.S. in Food Chemistry & Quality Assurance (January-June, 2017)**  
**Subject: Advanced Food Chemistry**  
**Course Code: AFC-501**

**Full Marks: 40**

**Time: 02 hours**

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

1. a) What is browning reaction? Discuss in details non-enzymatic browning reaction. 2+5  
b) What do you mean by the term "Resistant Starch"? What does make a starch resistant? 1.5+1.5
  
2. a) Write down the following reactions of protein 6  
    i) Esterification  
    ii) Van Slyke Reaction  
    iii) Reaction with formaldehyde  
b) Illustrate modification of protein during processing and storage. 4
  
3. a) What is rancidity? Discuss about different types of rancidity. How to prevent it? 1+2+2  
b) What is interesterification? Compare between chemical and enzymatic interesterification. Write down health implications of interesterification. 1+2+2
  
4. a) What is enzyme? Classify enzyme based on the reaction they catalyze. 1+3  
b) Discuss briefly role of enzymes in different food industry. 6
  
5. a) Classify vitamins. Discuss about absorption and storage of vitamins in human body. 1+3  
b) Why does water show different physical properties from other similar compounds? 3  
c) Write a short note on "Retrogradation of Starch". 3

**Chittagong Veterinary and Animal Sciences University**  
**Department of Applied Chemistry and Chemical Technology**  
**M.S. in Food Chemistry & Quality Assurance (January-June, 2017)**  
**Subject: Food Analysis and Instrumentation**  
**Course Code: FAI-501**

**Full Marks: 40**

**Time: 02 hours**

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

1. a) How UV-Visible spectroscopy works? 4  
b) Discuss in detail about the double beam UV-Visible spectroscopy. 6
2. a) What types of instruments & chemicals are used to extract the heavy metals in AAS? 4  
b) Why atomization is required in Atomic Absorption Spectroscopy? Write the advantages & disadvantages of flame atomization. 6
3. a) What is calibration curve? Why it is necessary in instrumental analysis? 4  
b) Why dilution of samples is required in instrumental analysis? 3  
c) IR active substances are polar species - Explain. 3
4. a) Write the factors which influence in producing fewer peaks. 4  
b) What do you mean by rotational & vibrational energy levels? Discuss shortly about the types of molecular vibrations. 6
5. a) Why water & alcohols are seldom employed as solvents in IR? 4  
b) State Beer's-Lamberts law. Write the limitations of UV-Visible spectrophotometer. 4  
c) What solvents are used in IR spectroscopy? 2

**Chittagong Veterinary and Animal Sciences University**  
**Department of Applied Chemistry and Chemical Technology**  
**M.S. in Food Chemistry & Quality Assurance (January-June, 2017)**  
**Subject: Food Toxicology**  
**Course Code: FTO-501**

**Full Marks: 40**

**Time: 02 hours**

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

1. a) Define toxicology? 2  
b) With the help of a flow chart describe the fate and effects of toxicants in human body 4  
c) Write down the four major air pollutants with their sources and health effects. 4
  
2. a) Which heavy metals are considered as toxicants in food? Write a short note on "Arsenic contamination in food". 5  
b) Briefly describe the food contamination in Bangladesh. 5
  
3. a) Describe the types of liver injuries by toxicants. 2  
b) Discuss different types of toxic response in respiratory system. 4  
c) Which heavy metals are found as nephro toxicants? Describe. 4
  
4. a) Which factors increase the complexity of toxicants elimination process in human body? Explain. 2  
b) Discuss the elimination process of toxicants through minor routes. 3  
c) Which are major routes of elimination of toxicants from human body? Describe about hepatic elimination. 5
  
5. Define with examples: 10
  - a) Dose and threshold dose
  - b) Dose-response relationship
  - c) Toxic symptoms and toxic effects
  - d) Clinical and forensic toxicology
  - e) Animal and plant toxins.

**Chittagong Veterinary and Animal Sciences University**  
**Department of Applied Chemistry and Chemical Technology**  
**M.S. in Food Chemistry & Quality Assurance (January-June, 2017)**  
**Subject: Food Additives**  
**Course Code: FAD-501**

**Full Marks: 40**

**Time: 02 hours**

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

1. a) Describe the benefits of additives. 5  
b) Draw the structure: 5
  - i)  $\beta$ -carotene
  - ii) Gamma Tocopherol
  - iii) Ascorbic acid or Vitamin C
  - iv) Saccharin (Sodium salt)
  - v) Aspartame
  
2. a) What do you mean by flavor enhancer? Draw a table mentioning flavor dosage of different kinds of food. 5  
b) Write the toxicological effect of saccharin. 5
  
3. a) Describe factors related in selecting a food antimicrobial agent. 4  
b) Mention the chemistry, target microorganisms and activity of dimethyl dicarbonate. 6
  
4. a) What are acidulants? Write the name of commonly used acidulants and their common functions. 5  
b) Write the microbial functions and toxicology of acetic acid. 5
  
5. a) Enumerate the chemistry of enzymatic browning reaction. 4  
b) Write short note on "Complexing agents". 6

**Chittagong Veterinary and Animal Sciences University**  
**Department of Applied Chemistry and Chemical Technology**  
**M.S. in Food Chemistry & Quality Assurance (January-June, 2017)**  
**Subject: Waste Management in food industry**  
**Course Code: WMI-501**

**Full Marks: 40**

**Time: 02 hours**

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

1. a) Describe the by-products from fruits and vegetables and how can you utilize them? 7  
b) Mention all names of biological treatment methods in a flow chart. 3
2. a) What is acid rain and how does it occur? 3  
b) What are the ecological effects of acid rain? 3  
c) What necessary measures should be taken to minimize the acid rain? 4
3. a) Briefly describe the storage and disposal of high level nuclear reactor wastes. 5  
b) Briefly describe the materials recovery facility. 3  
c) Describe the encapsulation technique for toxic chemical disposal. 2
4. a) What are primary air pollutants? Describe the main sources of CO and NO<sub>x</sub> emission. 4  
b) How do you propose to control NO<sub>x</sub> and SO<sub>x</sub> emission? 6
5. a) What is incineration? Describe short note on rotary kiln incinerator. 5  
b) What do you mean by waste minimization? Write the processes of waste minimization. 5