

**UNIVERSITY OF AGRICULTURE, ABEOKUTA**

COLLEGE OF FOOD SCIENCE AND HUMAN ECOLOGY (COLFHEC)

**DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY**

**B.Sc. Degree Examinations**

**First Semester 2008/2009 Session**

**October, 2009**

**FST 309: Basic Food Chemistry**

**Time: 2½ Hrs.**

**INSTRUCTION**

*Answer all questions in section A and one (1) question each from sections B and C*

**SECTION A**

- I) List four (4) benefits derivable from the study of food chemistry.
- II) Explain the observation stated below:  
  
Maltose and sucrose are disaccharides but presence of maltose could increase the rates of non-enzymic browning reaction (maillard) while sucrose may not.
- III) Oleic (18, 1, 9), linoleic (18, 2, 9 & 12) and Linolenic (18, 3, 9, 12 & 15) acids are examples of unsaturated fatty acids that are commonly found in oils of plant origin. Write the structural formula of each of the fatty acids. Which one of them will be hydrogenated first and why?
- IV) Myoglobin is the pigment of red meat, while gluten is the protein of wheat flour. What are the main protein constituent of animal skins, bones and connective tissues? This main protein of animal skin is said to be rich in proline, hydroxyproline and glycine. Write the structural formulae of these amino acids.
- V) Write an equation to represent the production of carbohydrates in plants. What is the name given to this process?.
- VI) Glucose and fructose are both monosaccharide. Comment about the difference in their structures.
- VII) Name the class of carbohydrates that has been associated with flatulence.

- VIII) Name two (2) polysaccharides that make up starch.
- IX) Write a general equation to represent the hydrolysis of starch.

**Answer 'True' or 'False' to the following statements (Questions X-XIII)**

- X) All monosaccharides and disaccharides act as reducing agents.
- XI) Starch is insoluble in cold water
- XII) Low temperatures destroy enzymes.
- XIII) Ascorbic acid is an antioxidant but not a preservative.
- XIV) Which vitamins are mostly affected by blanching?
- XV) What is the relationship between cyclamate and saccharin?
- XVI) Herbs and Spices belong to which category of food additives?
- XVII) Name the most widely used flavour modifier.
- XVIII) Name two (2) enzymes involved in cheese manufacture and state the function of each.
- XIX) Propose the best method for storage and preservation of food with respect to retention of vitamins.
- XX) What is the other name used to describe food gums?
- XXI) What is the main function of cellulose in the diet?
- XXII) Give an undesirable effect of pectin in foods.
- XXIII) What is the main property of pectin employed in jam production?.
- XXIV) Name one (1) method used for chemical modification of native starches.

**SECTION B**

- 1 Write short notes on the following:
- (a) Sweeting agents
- (b) Antimicrobial agents

(c) Flavour modifiers

2(a) Highlight the factors affecting enzyme action.

(b) Discuss the application of enzymes in the following food industries:

- (i) Breadmaking
- (ii) Production of alcoholic drinks
- (iii) Confectionery.

### SECTION C

3(a) Distinguish between steroids and sterols. What are the physiological and nutritional roles of steroids and sterols?

(b) Define plasticity of fat. How is plasticity of a fat related to its chemical composition? Tripalmitin and tristearin are examples of triglycerides, would you expect these triglycerides to exhibit plasticity or not? Give reason(s) for your answer.

(c) What are the factors that can affect the process of oil hardening in an industrial setting?

4(a) Explain the term iso-electric point of amino-acid and indicate the practical application of this property in protein separation technique.

(b) What are the mechanical and sensory implications of oxidation-reduction reactions of proteins?

(c) Explain the term "caramelization" and discuss its chemistry and application in food processing and product development.

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**B.Sc. Degree Examinations**

**First Semester 2008/2009 Session**

**October, 2009**

**FST 305: General Microbiology**

**Time: 2Hrs.**

**INSTRUCTION**

*Candidates should answer all questions in Section A and any Two (2) questions in section B.*

**SECTION A**

1. The cell is composed of an organic colloidal complex called the \_\_\_\_\_
2. Organisms made up of simple cells are referred to as \_\_\_\_\_
3. Microorganisms that exist in various types of habitat are said to be \_\_\_\_\_.
4. The first person credited with the discovery of microorganisms is \_\_\_\_\_
5. \_\_\_\_\_ discovered the causative agent of tuberculosis.
6. Fungi-like bacteria are referred to as the \_\_\_\_\_
7. The backbone of the bacteria cell wall is a macromolecule called \_\_\_\_\_
8. X 100 objective is usually referred to as the \_\_\_\_\_ lens.

9. High \_\_\_\_\_ of the cell wall of some bacteria make them difficult to retain their stain.
10. Magnification is the product of \_\_\_\_\_ and \_\_\_\_\_.
11. The resolving power of the electron microscope is \_\_\_\_\_ times greater than that of light or ultraviolet microscope.
12. \_\_\_\_\_ is an energy parasite that cannot synthesise ATP as source of energy but depends on the host cell.
13. \_\_\_\_\_ is an example of a small pleomorphic bacterium-like organism that is ellipsoidal or rod shaped.
14. The time interval required for a bacterium cell to divide or required for the population to double itself is called the \_\_\_\_\_ time.
15. The phase of cell growth in which cell multiplication takes place rapidly is referred to as the \_\_\_\_\_ phase.
16. Organisms that survive the normal temperature of pasteurization but do not grow at that temperature are called \_\_\_\_\_ organisms.
17. \_\_\_\_\_ grow in the presence or absence of oxygen.
18. Organisms that utilize organic carbon compounds as their source of carbon are said to be \_\_\_\_\_
19. Examples of nitrogen fixing bacteria include \_\_\_\_\_ and \_\_\_\_\_.
20. A particle of virus is called \_\_\_\_\_

21. A \_\_\_\_\_ is a virus that invades bacteria.
22. The mycelium is composed of several strands known as the \_\_\_\_\_.
23. \_\_\_\_\_ has one of the longest spore gun known to man.
24. The distinguishing characteristic of the class Ascomycetes is the production of \_\_\_\_\_.
25. Basidiomycetes have fruiting bodies known as the \_\_\_\_\_.

## **SECTION B**

- 1(a) Write short notes on the Differential staining techniques.
- (b) Briefly differentiate between Bacteria and viruses.
  
2. Write short notes on:
  - (a) Classification of media
  - (b) Preservation of laboratory pure cultures.
  
- 3 (a) Write short notes on the harmful and beneficial aspects of fungi.
- (b) Enumerate the characteristics of the Class Ascomycetes.

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COLLEGE OF AGRICULTURAL MANAGEMENT, RURAL DEVELOPMENT AND CONSUMER  
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**DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY**

**B.Sc. Degree Examinations**

**Second Semester 2007/2008 Session**

**December, 2008**

**FST 314: Chemical and Instrumental Analysis of Food**

**Time: 2Hrs.**

**INSTRUCTION**

*Answer all questions in section A and two (2) questions in Section B.*

**SECTION A**

- I. List four (4) methods for determining available carbohydrates in foods. (2 marks).
- II. Comment on the use of 3, 5 – Dinitrosalicylic acid (DNS) in the colorimetric determination of available carbohydrates in food. (3 marks).
- III. What is the principle involved in the copper reduction methods employed in determination of carbohydrates in foods? Name one common reagent used in these methods (3 marks).
- IV. Name a common technique employed in the assay of each of the following vitamins in foods: Riboflavin, Vitamin A (Retinol), Vitamin C. (3 marks).

- V. Name one technique applicable to the routine estimation of many vitamins in food. What is the important consideration in the use of this method for vitamins? (2 marks).
- VI. Give the most common method used for estimation of each of the following food additives:
- weak acid preservatives
  - nitrates and nitrites
  - anti oxidants (3 marks).
- VII. Name one common reagent employed in the titrimetric determination of salt in foods (1 mark).
- VIII. Name the dye used in the determination of ascorbic acid in foods (1 mark).
- IX. What is the relationship among the terms 'lightness', 'hue' and 'Chroma' as used in the colour determination of foods (3 marks).
- X. In the metal analysis of foods, suggest an appropriate oxidizing agent(s) for each of the following situations:
- (a) If sample contains significant levels of fat
- /2
- (b) Determination of lead or calcium
  - (c) Destruction of proteins and carbohydrates (4 marks).
- XI. List two (2) methods used for the separation of interference during metal analysis of foods. (2 marks).
- XII. True or False?
- (a) Dietary fibre is also known as non-starch polysaccharide.
  - (b) Potassium and sodium are trace elements found in foods.
  - (c) Gallates can be measured by colorimetry
  - (d) Infrared drying lamps and microwave ovens are not suitable for determining moisture of foods (4 marks).



- XIII. What is the relationship between the 'moisture content' of a food and its 'water activity'? (2 marks).
- XIV. Which of the terms in XIII above is more satisfactory as a measure of the likely keeping qualities of a food? (1 mark).
- XV. List the methods available for measuring the moisture content of foods. (5 marks).
- XVI. What is the principle involved in the protein determination of foods by the Kjeldahl method? (3 marks)
- XVII. The estimation of the fat content of a food almost invariably involve the estimation of the lipid fraction but not the true fat content . Explain (2 marks).
- XVIII. What type of oven and at what temperature is appropriate for foods that may decompose at the general drying temperature of 100°C? Give an example of such foods. (3 marks).
- XIX. Name the principle (technique) involved in:  
(i) moisture determination by drying  
(ii) fat determination using solvents and gravimetry (2 marks).
- XX. In the Kjeldahl method for protein determination, state the function of each of the following reagents:  
(a) concentrated tetraoxosulphate (VI) acid  
(b) sodium hydroxide  
(c) boric acid  
(d) standard hydrochloric acid.
- XXI. List three (3) important instruments/apparatus required in the Kjeldahl method. (3 marks).
- XXII. Name the most common parameter that is determined to provide information about the nature of fats and oils. (1 mark).
- XXIII. Why is it important to have a knowledge of the nature of fats and oils? (3 marks).

## SECTION B

1. Write short notes on each of the following methods for measuring the colour of foods:
  - (a) The Munsell System
  - (b) The CIE System
  - (c) The Hunter Lab system (20 marks).
  
2. (a) Give a comparison among the methods used for the determination of the following food preservatives:
  - (i) Salt
  - (ii) Sulphur dioxide(b) Distinguish between 'Dry Ashing' and 'Wet Oxidation' of foods employed in mineral analysis. (20 marks)
  
3. List and describe briefly other methods (besides the Kjeldahl method) used for determining protein in foods. (20 marks).

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**December, 2008**

**FST 316: Chemical and Instrumental Analysis of Food**

**Time: 2Hrs.**

**INSTRUCTION**

*Answer all questions in section A and two (2) questions in Section B.*

## SECTION A

- I. List the components that are measured in the 'Proximate analysis' of foods (3 marks)
- II. Give two (2) advantages of modern instrumental methods of food analysis (2 marks).
- III. List four (4) factors to be considered in the choice of method(s) used for the analysis of foods (2 marks)..
- IV. What is the name given to human errors arising from incorrect reading of equipments or badly designed experiments? How can this type of error be minimized? (3 marks)
- V. Give an example of the application of Redox titrations in food analysis. Give the name of the standard solution and indicator involved. (3 marks).
- VI. What is the principle involved in the application of refractometry in food analysis? Give the mathematical relationship and an example of a food component estimated by this method. (3 marks).
- VII. Why is emission spectroscopy of limited importance in food analysis? (1 mark)
- VIII. Spectroscopic methods involving the absorption of radiation are based on \_\_\_\_\_ Law. State the law and give its mathematical expression. (3 marks).
- IX. Give a Schematic diagram of a simple colorimeter. (3 marks).
- X. What type of light source is suitable when applying each of the following types of spectrophotometry to food analysis: visible, UV, IR and NIR? (4 marks)
- XI. Identify the chromatographic technique that is based on each of the following principles:
  - (a) Differences in relative affinity of compounds for the adsorbent used as the stationary phase.
  - (b) Affinity of ions in solutions for sites of opposite polarity in the stationary phase (2 marks).
- XII. Give one important characteristic of HPLC detectors. (1 mark).

XIII. In the right order, list three (3) major steps in sampling. (3 marks).

**True or false?**

XIV. The validity of the conclusions drawn from the analysis of a food depends only on the sampling methods used but not on the preservation method. (1 mark).

XV. An ideal sample should be identical in some of its intrinsic properties with the bulk of the material from which it is drawn. (1 mark).

**Identify the sampling method applicable in each of the following cases: (4 marks).**

XVI. Populations in which all elements have an equal chance of being included in a sample.

XVII. Drawing samples based on experience of the investigator.

XVIII. Separating the population elements into overlapping groups and selecting a simple random sample from each group.

XIX. Drawing a 1 in K sample from a list of units.

What should be done to obtain a representative sample from each of the following types of food? (4 marks).

XX. Dry foods

XXI. Meat and meat products

XXII. Hard foods

XXIII. Fats

XXIV. Calculate the number of moles in each of the following (5 marks)

(a) 10.6g of Sodium trioxo carbonate (IV)

(b) 6.3g of trioxo nitrate (V) acid

(c) 20g of sodium hydroxide

(d) 24.5g of tetraoxosulphate (VI) acid

(e) 73g of hydrochloric acid

(Na = 23, Cl = 35.5, S = 32, N = 14, H = 1, O = 16, C = 12).

XXV. In the titrimetric determination of the salt content of meat products, an excess of standard silver nitrate solution was added to 3g of the meat product in a conical flask.

- (a) Write a balanced equation for the reaction.
- (b) How many moles of silver nitrate is involved in the reaction? (3 marks).

XXVI. How would you prepare the following reagents used in Kjeldahl method for nitrogen and protein determination?

- (a) 40% sodium hydroxide solution
- (b) 0.1M tetraoxosulphate (VI) acid (4 marks)

XXVII. Calculate the moisture content and the dry matter of a food sample provided the

following:

Weight of dish and lid = 20.05g

Weight of dish, lid and sample before drying = 433.02g

Weight of dish, lid and sample after drying = 142.03g

(4 marks).

## SECTION B

1 (a) What are the special considerations in each of the following instrumentation of Gas Chromatography?

- (i) Carrier gas supply
- (ii) Injection system
- (iii) Columns/Packings/Column ovens
- (iv) Detector (14 marks).

(b) (i) Name a titration method applicable to the estimation of salt in foods such as cheese or butter.

- (ii) What is the limitation of this method?
  - (iii) Outline the principle involved using a specific example (6 marks).
- 2 (a) Draw a simple schematic diagram to show the layout of a Uv/vis spectrophotometer (5 marks)
- (b) Highlight the principle, application, limitations and/or advantages in each of the following instrumental methods of food analysis: (Note: Procedure not required).
- (i) Fluorimetry
  - (ii) Flame Photometry
  - (iv) Atomic Absorption Spectrophotometry (AAS). (15 marks).
3. Distinguish among the general types of samples and those analyzed by the quality control laboratory (20 marks).

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**Second Semester 2007/2008 Session**

**December, 2008**

**FST 306: Principles of Sensory Evaluation**

**Time: 2Hrs.**

**INSTRUCTION**

*Answer all questions in section A and any two (2) in Section B.*

1. Name two (2) sense organs employed in sensory evaluation of foods and give one (1) attribute of food measured by each organ. (4 marks).
2. Draw a simple diagram of the tongue showing the location of the sensory cells. (4 marks).
3. List three (3) 'difference test' methods. (3 marks)
4. Distinguish between 'difference test' and 'preference test'. (2 marks).
5. List two (2) commonly known 'descriptive methods'. (2 marks).
6. List three (3) applications of sensory analysis. (3 marks).
7. Which chemical species are responsible for each of the following taste sensations: saltiness, sweetness, sourness?. (4 marks)
8. The toning down of sensation when two tastes are presented is known as \_\_\_\_\_. (1 mark).
9. Differentiate between 'Ageusia' and 'Hypogeusia'. (2 marks).
10. List the basic requirements for sensory testing facilities. (5 marks).
11. List the basic qualities and sub-qualities of taste (7 marks).



12. List the factors that influence olfaction. (5 marks).
13. Give the terms used to describe each of the following textural attributes of foods:
- Elasticity
  - Cohesiveness
  - Particle size and shape
  - Moisture content
  - Fat content (5 marks)
14. List the five (5) sense receptors present on the skin. (5 marks).
15. Highlight the tasks involved in establishing sensory panels. (6 marks).

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## **SECTION B**

- 1a. Write short notes on the following:
- (i) Product-Oriented Testing
  - (ii) Consumer-Oriented Testing
- b. Draw the plan of a simple sensory testing laboratory. (20 marks)
- 2a. Discuss briefly the factors that influence gustation.
- b. Design a questionnaire (ballot) for each of the following:

- (i) Basic taste recognition
- (ii) Recognition of taste intensities. (20 marks)

3a. In a tabular form, indicate the number of samples and method(s) of analysis of data for each of five (5) sensory evaluation methods.

b. Describe briefly, the mechanism of Olfaction. (20 marks).

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**Second Semester 2007/2008 Session**

**December, 2008**

**FST 318: Food Engineering Applications**

**Time: 2Hrs.**

**INSTRUCTION**

## SECTION A

*Answer all question in section A and any other two questions from section B.*

1. What are thermophysical properties? List four thermo-physical properties you know.
2. List the objectives for thermal processing as a means of extending shelf-life and thermal processes aimed at each of those objectives.
3. In food science literatures, thermal death time  $F$  is normally express as  $F_T^Z$ .  
 $Z$  is -----  $T$  is -----.
4. What is the difference between normal stress and shear stress?
5. The influence of shear stress on solids and liquids lead to a broad classification of such materials as \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
6. A typical liquid transport system will consist of four basic components. List those components.
7. What is the difference between centrifugal pumps and positive displacement pumps?
8. Liquids with high viscosity are difficult to transport with centrifugal pumps, why?
9. Draw a typical Drying curve and identify the major points.
10. List the ways by which retorting (heat processing) can be achieved in thermal processing.

## SECTION B

- 1a. There are three different categories of thermal treatments that have been developed to obtain optimum quality products. List these methods. Explain one of the methods.
- b. In tabular form, explain the advantages and disadvantages of thermal processing compared to other long term methods of food preservation (freezing and drying).

- 2a. Estimate the drying rate and time needed to reduce the moisture content of a 100 $\mu$ m diameter spherically shaped droplet falling in a spray dryer from 60% to 30%.

The initial density of the droplet is 900kg/m<sup>3</sup>. The droplet is in an air stream such that  $T_{\infty} = 200^{\circ}\text{C}$ ,  $h = 200\text{W/m}^2\text{ }^{\circ}\text{C}$ ,  $T_s = 60^{\circ}\text{C}$ ,  $P = 101.3\text{kpa}$  and  $h_{fg} = 2370.7\text{kJ/kg}$ . Assume that a constant rate drying rate applies, over the total drying process.

- b. Draw and explain the operation of one type of dryers.

- 3a. What is the difference between Laminar and turbulent flow?

- b. In selecting a pump for a given system, it is imperative that the characteristics of the system are clearly defined. What are those characteristics?

- c. Oil flows through a pipe which contracts from 450mm diameter at A to 300mm diameter at B and then forks, one branch being 150mm diameter discharging at C and the other branch 225mm diameter discharging at D. If the velocity at A is  $1.8\text{m s}^{-1}$  and velocity at D is  $3.6\text{m s}^{-1}$ , what will be the discharge at C and D and the velocity at B and C?



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**Second Semester 2007/2008 Session**

**December, 2008**

**FST 310: Food Rheology**

**Time: 2Hrs.**

**INSTRUCTION**

*Answer any four (4) questions. All questions carry equal marks.*

1. (a) What do you understand by the term “Food Rheology”?  
(b) Highlight the numerous areas where rheological data are needed in the food industry.  
(c) Explain the concept of TPA.
2. (a) With the aid of well labelled diagrams, describe common types of non-Newtonian fluids encountered in food process engineering.  
(b) Anyone beginning the process of learning rheology must first ask the question; “why should I make rheological measurement”? As a student of rheology, attempt to answer

this question.

3. (a) Name five typical empirical viscosity testing equipment and their applications in food products
  - (b) Explain in detail, the following factors affecting rheological measurements:
    - i. Composition and ingredient of the test material
    - ii. Pressure
    - iii. Measuring conditions
    - iv. Shear rate
    - v. Temperature
- 
4. (a) Show that Reynolds number is dimensionless.
  - (b) Explain the following as used in process control:
    - i. In-line viscometers
    - ii. On-line viscometers
    - iii. Off-line viscometers
  - (c) Vividly enumerate the practical considerations in selecting a process control viscometer,
- 
- 5.(a) Define the following properties of a fluid:
    - i. Density
    - ii. Mass density
    - iii. Specific Weight
    - iv. Relative density
    - v. Viscosity



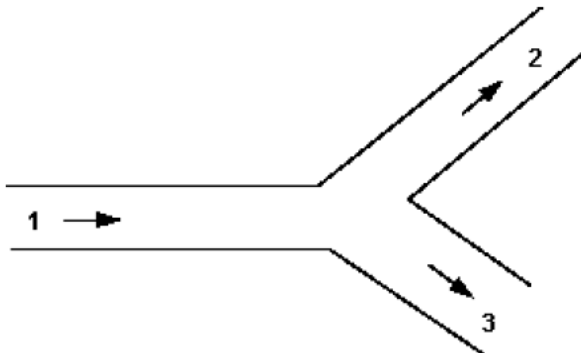
(b) Briefly describe a simple way of measuring the rate at which a fluid is flowing along a pipe.

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(c) An empty bucket weighs 2.0 kg. After 7 s of collecting a fluid into the bucket it weighs 8.0 kg. Calculate the mass flow rate of the fluid. How long will it take to fill the same bucket with 8 kg of another fluid with a mass flow rate of  $1.7 \text{ kg s}^{-1}$ ? Assuming the density of the fluid is  $850 \text{ kg m}^{-3}$ ; calculate the discharge (Q) of the fluid.

6. (a) List three sources of frictional losses in a pipe.

(b) Consider a pipe coming from a junction as shown below; derive an equation to determine the velocities in the pipe using the continuity principle.



(c) If pipe 1 diameter = 50mm, mean velocity 2m/s, pipe 2 diameter (40mm) takes 30% of total discharge and pipe 3 diameter is 60mm. What are the values of discharge and mean velocity in each pipe?

(d) Differentiate between laminar and turbulent flow.

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**Second Semester 2007/2008 Session**

**December, 2008**

**FST 304: Food Microbiology**

**Time: 2 Hrs.**

**INSTRUCTION**

*Candidates should answer all questions. Each question carries two marks.*

1. \_\_\_\_\_ is the causative agent of Hemolytic Uremic Syndrome (HUS).
2. *Campylobacter jejuni* produces two types of diarrhea \_\_\_\_\_ and \_\_\_\_\_
3. \_\_\_\_\_ produces a rare symptom known as Guillain Barre Syndrome (GBS).
4. Name the four pathogenic species of *Shigella*
5. Identify the species of *Shigella* that is most common in Nigeria.
6. Listeriosis is caused by \_\_\_\_\_
7. \_\_\_\_\_ is the causative agent of meningitis, septicemia and abortion in animals.
8. \_\_\_\_\_ is the main distinguishing feature between shigellosis and salmonellosis.
9. The actinomycetes are important in the production of \_\_\_\_\_
10. The *Aspergillus* species are important in the production of \_\_\_\_\_ acid and \_\_\_\_\_ acid.
11. The *Sporotrichum* species are important in \_\_\_\_\_

12. The most reliable indicators tend to be \_\_\_\_\_ specific.
13. The Eijkman method for the determination of *E coli* can also be called \_\_\_\_\_
14. Explain why the direct search for the presence of specific pathogens or viruses in water is impracticable for routine control purposes.
15. The MPN method is also known as \_\_\_\_\_ method and the \_\_\_\_\_ method.
16. The MPN method consist of three tests namely \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
17. MacConkey broth purple is a preferred broth for water inoculation because of the presence of \_\_\_\_\_
18. Describe the tube combination that is ideal for a polluted water.
19. The membrane filter coliform test uses a sterile absorbent pad that is saturated with \_\_\_\_\_
20. The ideal incubation period and time for faecal coliforms is \_\_\_\_\_ and \_\_\_\_\_ /2
21. The ideal medium and time for the enumeration of faecal streptococci is \_\_\_\_\_ and \_\_\_\_\_
22. Explain the reasons why the *C perfringes* test has little place in the examination of recently contaminated water.
23. *Staphylococcus aureus* will appear as pigmented colonies with \_\_\_\_\_ colour on staphylococcal medium 110.
24. Why do salmonella and shigella form colourless colonies on SS agar?
25. Why is the membrane filtration technique preferred to the classical plating method in the assay of the efficiency of treatment procedures of water?
26. What does the presence of coliforms in any given water sample indicate?
27. Microbial contamination in air exists as \_\_\_\_\_
28. \_\_\_\_\_ and \_\_\_\_\_ are generally more numerous as air contaminants than vegetative cells.
29. The two limitations of impaction on solid surfaces are \_\_\_\_\_ and \_\_\_\_\_.
30. The two limitations of liquid impingement are \_\_\_\_\_ and \_\_\_\_\_.

31. Differentiate between food infections and food intoxications.
32. The incubation period for typhoid fever is \_\_\_\_\_.
33. \_\_\_\_\_ is the causative agent of gas gangrene.
34. Botulism is caused by \_\_\_\_\_.
35. Why is *Clostridium botulinum* described as a horrifying disease?
36. \_\_\_\_\_ is required for the synthesis of acetyl choline.
37. Why is botulinum toxin described as one of the most dangerous toxins known to man?
38. More than 90% of all cases of botulism today are caused by the consumption of \_\_\_\_\_.
39. Explain the reason why the incidence of cholera infection is so fatal.
40. \_\_\_\_\_ control of drinking water supply is a way of controlling cholera.
41. What is a saxitoxin?
42. Identify four bacteria that cause the spoilage of flesh meat.
43. Name the 3 types of bacteria greening of cured and cooked meat.
44. Identify the disease causing bacteria of meat and poultry products.
45. Identify the spoilage flora of dairy products.
46. The spoilage flora of dairy milk includes \_\_\_\_\_ and \_\_\_\_\_.
47. The bacteria that causes rancidity and lipase production in butter are \_\_\_\_\_.
48. To decrease the possibility of butter becoming rancid, you can add \_\_\_\_\_% of \_\_\_\_\_ by weight.
49. \_\_\_\_\_ is an important factor in determining the type of organism which can grow and cause loss of fruits and vegetables.
50. \_\_\_\_\_ has been detected often in flours.

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**B.Sc. Degree Examinations**

**Second Semester 2007/2008 Session**

**December, 2008**

**FST 312: Unit Operations in Food Processing**

**2½ Hrs.**

**INSTRUCTION**

*Answer all questions in Section A and any other three (At least one from each section).*

**SECTION A**

1. Grape juice at a rate of 3 kg/s is concentrated in a single effect evaporator from 18% to 23% solid content. Calculate (a) the product flow rate (b) the evaporation rate (c) the steam consumption (d) the steam economy and (e) the required heat transfer area of the evaporator if juice enters the evaporator at 50°C, the juice boils in the evaporator at 50°C, saturated steam at 100°C is used as the heating medium, the condensate exit at 100°C, the heat capacity of the juice is 3.7 kg/kg°C and 3.6 kJ/kg °C at the inlet and outlet of the evaporator respectively, and the overall heat transfer coefficient is 1500W/m<sup>2</sup>°C. (Note: Enthalpy of steam at 100°C = 2676 kJ/kg; Enthalpy of condensate at 100°C = 419 kJ/kg; Enthalpy of saturated vapour at 50°C = 2592 kJ/kg).

2. A dilute solution is subjected to flash distillation. The solution is heated in a heat exchanger and then flashes in a vacuum vessel. If heat at a rate of 270,000 kJ/hr is transferred to the solution in the heat exchanger, calculate: (a) the temperature of the solution at the exit of the heat exchanger (b) the amount of the overhead vapour and residual liquid leaving the vacuum vessel. The following data are given: flow rate and temperature of the solution at the inlet of the heat exchanger is 1000kg/h and 50°C, heat capacity of the solution is 3.8 kJ/kg°C and absolute pressure in the vacuum vessel is 70.14 kPa. (Note: Saturation temperature and enthalpy of saturated vapour at 70.14 kPa is 90°C and 2660 kJ/kg, respectively).

### SECTION B

- 1a. Explain briefly the application of the concept of sedimentation as used in a typical food processing operation.
- b. Rate of throughput in sieving is a function of several factors. List those factors. Mention various examples/types of sieves you know and their application in Food Processing.
- c. List those factors that control the terminal velocity of a particle during separation.

### OR

- 2a. What advantage does centrifugal separation have over sedimentation as a separation technique. Explain concisely a typical example of application of centrifugation in a food processing situation.
- b. Using a simple diagram, show the concept of liquid separation in a centrifuge with an example. What factors affect the force applied?
- c. Mention the various types of crystallizers you know.

### SECTION C

- 1a. What do you understand by Gas absorption and desorption?  
Differentiate between them with typical food processing examples.
- b. List those factors that governs the extraction process with common examples that you know.
- c. With various examples, clearly explain briefly, the concept of crystallization as a unit operation in Food Processing.

OR

- 2a. Mass transfer in 1(a) above is affected by several factors. Explain briefly the effect of such factors on the process.
- b. What difference(s) exists between extraction and expression? Briefly explain what you understand by the term "extraction battery".
- c. Itemize those factors that affect the rate of nucleation and crystal growth.

### SECTION D

- 1a. Using a clear diagram, explain briefly the concept of reverse osmosis as used in the food industry.
- b. Mention the factors that affects the rate of evaporation of water from a known quantity of orange juice.
- c. Using a well labeled diagram only describe the workings of a distiller used in food industry.

OR

- 2a. Briefly explain the principle behind the application of distillation in Food Processing.
- b. Explain the workings of a single effect evaporator with the aid of well labeled diagram.
- c. What do you understand by forward and backward feed in an evaporation process.



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**First Semester 2007/2008 Session**

**July, 2008**

**FST 309: Basic Food Chemistry**

**Time: 2½ hrs.**

**INSTRUCTION**

Answer all questions in section A and one (1) question each from sections B and C.

**SECTION A**

I. Give reason(s) for the stated observation below:

Enzymic browning can be controlled by the use of acids and thermal inactivation of polyphenol enzyme, but non-enzymic browning increases with increase in temperature and extreme pH.

II. List three (3) differences between a native and a denatured protein?

III. Glutamic acid is a flavour enhancer and one of the two dicarboxylic amino acids. Name the other dicarboxylic amino acid and write the structural formulae of the two amino acids.

IV. Define Food chemistry and list four (4) benefits derivable from its study.

- V. Distinguish between free and adsorbed water in a food sample. Which of them is likely to pose problem during storage of cocoa powder?
- VI. Define plasticity of fat and explain why simple triglycerides do not exhibit plasticity.
- VII. Slipping, smoking, flash and fire points are physical properties of fats and oils which can be used to identify them. Define each of the stated physical properties.
- VIII. Re-arrange the table below by matching each fatty acid with appropriate structural formula and melting point. State the reason for your answer.

Common name of fatty acid	Structural formula	Melting point (°C)
Behenic	$\text{CH}_3 (\text{CH}_2)_{14} \text{COOH}$	-7.9
Capric	$\text{CH}_3 (\text{CH}_2)_2 \text{COOH}$	79.9
Palmitic	$\text{CH}_3 (\text{CH}_2)_{20} \text{COOH}$	31.6
Butyric	$\text{CH}_3 (\text{CH}_2)_8 \text{COOH}$	63.1

**P.T.O.**

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- IX. Indicate whether each of the following statement is True or False:
- Butter fat is not a simple Triglyceride
  - Histidine is a basic amino acid and an essential amino acid for an infant.
  - Iso-oleic acid is a geometric isomer of oleic acid.
  - The visco-elastic property of wheat flour is due to its protein and not its starch.
  - Lecithin is an emulsifier and a lipid.
- X. Write the structure and name of the most biologically active form of vitamin A.
- XI. Why does native starch need to be chemically modified?
- XII. With the aid of an equation only, show the oxidation of L-ascorbic acid.

- XIII. List the enzymes employed in breadmaking and give the specific function of each.
- XIV. Give two (2) technical uses of ascorbic acid in food processing.

### **SECTION B**

- 1 (a) Define the term "Food Additive".
- (b) Give an outline of the major categories of food additives.
- (c) Describe the effect of heat, light and air on the water-soluble vitamins.
- 2 (a) Describe each of the following phenomena and highlight their significance in foods:
- (i) Gelatinization (ii) Retrogradation.
- (b) Highlight and explain the factors that affect the strength of a starch gel.

### **SECTION C**

- 1 (a) Explain the term denaturation and briefly highlight the factors that could bring it about in a native protein.
- (b) How can you utilize the phenomenon of denaturation to enhance food processing?
- (c) Give an account of the chain reactions that may lead to the formation of brown pigment when yam tuber is peeled in air.
- 2 (a) Define hardening of oil and discuss in detail the factors that may affect the process of oil hardening in an industrial setting.
- (b) Distinguish clearly between hydrolytic and oxidative rancidity. What factors may bring about the two types of rancidity highlighted above?

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**B.Sc. Degree Examinations**

**First Semester 2007/2008 Session**

**July, 2008**

**FST 305:** General Microbiology

**Time Allowed:** 2Hrs.

**INSTRUCTION**

***Candidates should answer question 1 and any other three***

1. (i) What is the essence of closing laboratory doors?
  - (ii) What is the use of Laminar flow system in microbiology laboratory?
  - (iii) What is the difference between magnification and Resolving power of a microscope?
  - (iv) What is the colour of a Gram positive bacterium and which dye/staining reagent is responsible for that colour?
  - (v) What is the function of the Autoclave in the microbiology laboratory?
  - (vi) What do you understand by the term sterilization?
  - (vii) What is the function of an inoculating loop?
  - (viii) What is an agar slant?
  - (ix) When an organism is colourless under the microscope, how can you make it visible?
  - (x) Name two media that can be used for culturing bacteria.
- 
- 2 (a) Write on the contributions of the following to microbiology:
    - (i) Robert Koch
    - (ii) Joseph Lister
    - (iii) Louis Pasteur
  - (b) Distinguish between the Cell wall of the Gram positive and Gram negative bacteria.

- 3 (a) Distinguish between:
- (i) Bacteria and Viruses
  - (ii) Yeasts and moulds
- (b) What do you understand by the term Generation time?
4. Discuss the physical and nutritional requirements required for the growth of microbes.
- 5 (i) Briefly enumerate the characteristics of fungi pointing out the beneficial and harmful aspects.
- (ii) What are the distinguishing characteristics of the class ascomycetes?
  - (iii) Draw the structure of a named virus that infects bacteria.

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**Second Semester 2006/2007 Session**

**December, 2007**

**FST 316:** Chemical and Instrumental Analysis of Food

**Time Allowed:** 2 Hrs.

**INSTRUCTION**

- (i)** *Answer All questions in section A and any two in Section B .*
- (ii)** *This question paper should not be transferred to any other candidate during the examination session.*

**SECTION A**

- (I) Define the following:
  - (a) Aliquot
  - (b) Titrant
  - (c) Primary standard
  
- (II) List four (4) different types of titration commonly used in Food studies.
  
- (III) Differentiate between:
  - (a) End point and Equivalence point
  - (b) Acid and Alkali errors of a pH meter.

- (IV) A Sample of vinegar weighs 13.50g and requires 45.50ml of 0.2M sodium hydroxide for titration to the end point.
- (a) Illustrate the above titration with a suitable chemical equation.
  - (b) Find the percentage of acetic-acid in the vinegar (MW of Acetic acid = 60)
- (V) What is the weight (g) of pure sodium hydroxide pellets needed to prepare exactly 1 litre of 0.02M sodium hydroxide solution?
- (VI) Indicate whether each of the following statements is True or False:
- (a) Distillation and centrifugation are separation techniques, but they are not very useful in food analysis.
  - (b) Redox titration is the only titration that is less useful to a Food analyst because Oxidation-reduction reactions are not common in Food studies.
  - (c) An analysis that involves determination of iron (Fe) content of one hundred samples of maize flour can be described as proximate analysis.
  - (d) Most modern instrumental methods of analysis use sample sizes of usually less than one milligram.
- (VII) List four (4) traditional techniques used in food analysis.
- (VIII) Outline the instrumental and modern methods of food analysis.
- (IX) Comment on the light sources used in spectrophotometers.
- (X) Give one major difference between a simple colorimeter and a spectrophotometer. What advantage(s) does this difference offer over one another?

- (XI) Mention one (1) limitation of fluorimetry.
- (XII) What advantage does Atomic Absorption Spectrophotometry (AAS) has over flame photometry?
- (XIII) Classify chromatographic methods on the basis of separation technique and phases involved.
- (XIV) Comment on the principle involved in Inductively Coupled Plasma (ICP) emission spectroscopy and give its advantage.
- (XV) What type of titrimetric method is involved in the final stages of nitrogen and protein estimation by the Kjeldahl method.
- (XVI) List three (3) advantages of traditional methods over modern instrumental methods.
- (XVII) List two (2) advantages of modern instrumental methods over traditional methods.
- (XVIII) A traditional method which is more limited in use but play a very significant role in the estimation of fats is \_\_\_\_\_
- (XIX) When the specific rotation of a sugar is known, the polanmeter can be used to determine the amount of sugar present in a solution. Give the mathematical relationship involved.

## SECTION B



1. (a) Discuss the special considerations in HPLC instrumentation.
- (b) How is separation achieved in GLC and GSC?
- (c) Comment on the carrier gas supply in gas chromatography.
  
2. (a) Describe the principle, procedure and applications of AAS.
- (b) Outline the principle and application of redox titration in food analysis.

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3. (a) What are the conditions necessary for titrimetric analysis to be carried out?
- (b) In the determination of iron (Fe) content of food, potassium dichromate may be used as primary standard. If 0.235g sample of pure potassium dichromate when dissolved requires 27.50ml of iron (II) for titration. Compute the molarity of the iron (II). Equation of reaction is:



(At wt: K = 39, Cr = 52, O = 16, Fe = 56, H = 1)

- (c) Discuss the principles involved in Acid-Base titrations and its importance in food studies. Give relevant examples to illustrate your answer.



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**FST 314:** Principles of Food Analysis

**Time Allowed:** 2 Hrs.

**INSTRUCTION**

**(iii)** *Answer All questions in section A and one question each from Sections B and C.*

- (iv) ***This question paper should not be transferred to any other candidate during the examination session.***

### SECTION A

- (I) Define the following:
- (a) Food analysis
  - (b) Dry matter
  - (c) Absorbed moisture
  - (d) Crude protein
  - (e) Non-protein Nitrogen
- (II) Distinguish between free and bound lipids in a food sample. Which of them is often referred to as ether extract component of food?
- (III) Why is Kjeldahl's method of protein estimation often used as reference in protein analysis?
- (IV) List two other methods of protein analysis apart from Kjeldahl's method.
- (V) List three examples of acid-base titrations in food analysis.
- (VI) Explain the principles behind the determination of protein using the Biuret colour reagent.
- (VII) Indicate whether each of the following statements is True or False.
- (a) Wiji's solution can be described as a solution of iodine monochloride in acetic acid.

(b) The ash figure obtained during crude fibre determination should be equal to the ash figure obtained during mineral matter analysis.

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(c) Saponification and acid values are two indices of fat measuring the same quality since both of them are determined using alcoholic potash.

(d) Vitamin content of a food is very important and must be accounted for in proximate composition of food.

(VIII) Explain briefly the term 'trace elements' as used in food analysis.

(IX) List four (4) factors that govern the choice of method for analysis of metals in food.

(X) In the qualitative determination of sugars, molish reaction involves the use of \_\_\_\_\_ while naphthoresorcinol is used in \_\_\_\_\_ test.

(XI) List four (4) procedures employed in the separation of interferences during metal analysis of foods.

(XII) What is the main distinguishing technique between the Lane & Eynon (1923) and Munson Walker (1906) methods of sugar analysis?

(XIII) Comment on the modification involved in the Iodometric methods for determination of sugars.

(XIV) With the aid of equations, outline and comment on the principle involved in the alkaline ferricyanide method for determining sugars.

(XV) List two (2) optical methods applicable for the determination of sugars.

- (XVI) Outline the steps involved in the determination of metals in food.
- (XVII) Distinguish between the characteristics and effect of three (3) common reagents used in colorimetric determination of sugars.

### **SECTION B**

- 1 (a) Discuss the principles and considerations in the determination of (i) Lead and  
(ii) mercury in foods.
- (b) What are the considerations and effect of oxidizing agents used in wet digestion of foods?
- 2 (a) What is the principle involved in each of the following methods:
- (i) Identification and determination of sugars in milk products by HPLC
  - (ii) Determination of lactose in milk by the chloramine – T method.
  - (iii) DNS colorimetric determination of available carbohydrates in foods.

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- (b) Distinguish between two procedures that are based on reducing properties of the carbonyl group of sugars.

### **SECTION C**

- 3 (a) Describe the direct distillation method of moisture content determination of foods. What advantages has this method over the indirect method? Give two (2) examples of foodstuffs for which the direct distillation method will be preferred to the indirect method.

- (b) A sample of maize grain contains 69% carbohydrate, 1.0% protein, 4% fat, 2% ash and 2% indigestible fibre on wet basis. What is the proximate composition of the maize grain on dry basis if the moisture content of the grain is 12%?
- (c) Discuss briefly the importance of moisture content analysis in Food studies.
4. (a) Define and explain the importance of each of the following terms used in fat analysis:
- (i) free fatty acid (FFA)
  - (ii) peroxide value (PV)
  - (iii) Iodine value (IV)
- (b) What do you understand by the term: *hydrolysis of fats and oils*? Use appropriate chemical equation to illustrate your answer.
- (c) A 3.5g sample of palm kernel oil was dissolved in a mixed neutral solvent of diethyl ether and alcohol. The dissolved oil was then titrated against aqueous 0.1M NaOH shaking constantly until a pink colour persists for 15 seconds. If the sample of oil requires 5.2ml of the alkali, calculate the acid value of the palm kernel oil and hence the % free fatty acid (FFA) as Lauric acid (MW of Lauric Acid = 200g).

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**FST 306:** Principles of Sensory Evaluation

**Time Allowed:** 2 Hrs.

**INSTRUCTION**



- (v) **Answer All questions in section A and three questions in section B**  
(vi) **This question paper should not be transferred to any other candidate during the examination session.**

### **SECTION A**

1. Name the sensory cells of taste, smell and sight
2. Which organ provides the richest and most detailed source of sensory information?
3. List four (4) changes in processing operations that could require sensory analysis of the products.
4. Sensory programmes are established to assist Quality Control in monitoring \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_
5. Distinguish between 'sensation threshold' and 'detection threshold'.
6. Mention three (3) 'difference tests'.
7. What type of information is obtained by consumer-oriented tests and product-oriented tests?
8. List four (4) areas in which sensory analysis is applicable.
9. List four (4) attributes of a food which can be measured by human sense organs.
10. The primary taste qualities are \_\_\_\_\_.
11. Two sense organs which require the stimuli to be in solution for perception to take place are \_\_\_\_\_ and \_\_\_\_\_
12. Distinguish between the panels of consumer-oriented testing and product-oriented testing.

### **SECTION B**

1. Outline the steps involved in planning a sensory experiment.
2. Describe briefly the basic requirements and features of permanent sensory testing facilities.
3. Discuss the tasks involved in establishing sensory panels.
4. Describe the panelists' task, presentation of samples and analysis of data for each of the following tests:
  - (i) Pair-preference test
  - (ii) Ranking for acceptance.

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Second Semester 2006/2007 Session

December, 2007

FST 310: Food Rheology

Time Allowed: 2 Hrs.

INSTRUCTION

(vii) *Answer All questions in section A and any other two*

(viii) *This question paper should not be transferred to any other candidate during the examination session.*

SECTION A

- (a) What are semi-solid foods? Mention two examples.
- (b) List five instruments that gives subjective rheological results.
- (c) With the aids of diagram **only**, distinguish between shear, compressive and tensile stresses?
- (d) Measurement of fruit firmness on the basis of deformation resulting from application of physical pressure is a \_\_\_\_\_ method.
- (e) The intermediate between recoverable and non-recoverable deformation is \_\_\_\_\_.
- (f) Using equations **only**, what is the relationship between modulus of elasticity, poisson's ratio, bulk density and shear modulus?
- (g) The viscosity of Tapioca meal can be related to temperature by the equation:
- (h) Differentiate between laminar and turbulent flow using diagrams **only**.
- (i) List the various parameters impacting on the accuracy of viscosity data?
- (j) The basic unit of absolute viscosity is \_\_\_\_\_.
- (k) The unit of kinetic viscosity can be : \_\_\_\_\_, \_\_\_\_\_ or \_\_\_\_\_.

- (l) Kinetic viscosity =  $\frac{x}{y}$  ; what is x and y respectively?
- (m) The four principal quality factors in foods include \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
- (n) Oil at 25°C is being pumped through a diameter pipe at a rate of 5400kg per hour. What is the velocity of the liquid in the pipe? Assuming the liquid is now being pumped through a 2m diameter pipe, what will be the change in velocity if the liquid density is 998.2g/cm<sup>3</sup>?

## SECTION B

- 1 (a) Outline the importance of rheological data in the food industry?
- (b) Using appropriate rheograms with at least one example for each distinguish between Hookean, elastoplastic and non-linear elastic food materials.
- (c) In a tabular form, differentiate between pseudoplastic and dilatant liquids.
- (d) Milk flows through a pipe which contracts from 450mm diameter at A to 300mm diameter at B and then forks in which a branch being 150mm diameter discharging at C and the other branch 225mm diameter discharging at D. If the velocity at A is 1.8m/s and the velocity at D is 3.6m/s. What will be the discharge at C and D and the velocity at B and C.?
- 2 (a) Define the following terms in relation to Food rheology
- (i) elastic limit
- (ii) proportional limit
- (iii) yield point

- (iv) conservative deformation
  - (v) dissipative deformation
- (b) In a clear and concise manner, outline the basic properties of Hookean food materials.
- (c) List those factors that govern the transition of flow from laminar to turbulent flows or vice versa.
- (d) Determine the rate at which energy will be expended when pumping  $400\text{m}^3$  of oil per hour along a pipe which is 500mm long with a 0.2m outlet diameter. The oil has a viscosity of 0.5poise and a density of  $900\text{g/cm}^3$  while the pressure and diameter at the inlet are  $8 \times 10^3 \text{N/m}^2$  and 0.1m respectively. Determine the pressure at the outlet of the pipe if water is flowing through above at a pressure of  $8 \times 10^3 \text{N/m}^2$  and the diameter is 0.1m. The velocity at the inlet pipe is 10m/s and the pipe is elevated at about 5m above datum (which is also the point of the inlet pipe). What will be the velocity of water at the outlet pipe?
- 3 (a) What are ideal fluids? Explain briefly their basic characteristics and mention at least two examples.
- (b) Using a clear rheogram **only**, differentiate between thixotropic and rheopectic types of fluids.
- (c) Using a velocity-time graph **only**, show the distinguishing feature of turbulent and laminar flows.
- (d) Experimental results with a co-axial cylinder viscometer used for apple puree at 340K were as follows:

Shear rate $10^{-3} \left( \frac{1}{s} \right)$	1	1.5	2	3	4	5	6	7
Shear stress $10^{-4} \text{ (Pa)}$	1.06	1.22	1.37	1.62	1.8	2.01	2.10	2.21

Determine the rheological parameters required to describe the product.

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**FST 312:** Unit Operations in Food Processing

**Time Allowed:** 2 Hrs.

**INSTRUCTION**

*(i) Answer any four (4) questions*

*(ii) This question paper should not be transferred to any other candidate during the examination session.*

1. (a) What do you understand by the term Common Convention of Consistency of Units (CCCU)
  - (b) What are the requirements that must be satisfied by an acceptable cleaning process?
  - (c) With the aid of a well labelled diagram; describe the separation of immiscible liquids by centrifugation.
2. (a) List the major factors that are commonly specify by grading statements.
  - (b) Write a short note on the following:
    - i. Sedimentation
    - ii. Grading operation
    - iii. Energy balance
    - iv. Centrifugal clarification

3. (a) What are the advantages of membrane concentration over evaporation?
- (b) Apple juice with a specific gravity of 1.042 and a viscosity of  $1.40 \times 10^{-3} \text{ N s m}^{-2}$  contains 1.5% solids which have a density of  $1160 \text{ kg m}^{-3}$ . It is clarified at a rate of  $200 \text{ l h}^{-1}$  in a bowl centrifuge which has an operating volume of  $0.09 \text{ m}^3$  and a speed of 10 000 rpm. The bowl has a diameter of 5.5 cm and is fitted with a 4 cm outlet. Calculate the effect on feed rate an increase in bowl speed to 15 000 rpm and the minimum particle size that can be removed at the higher speed.
4. (a) Differentiate between sorting and grading
- (b) Vividly enumerate the application of expression in oils and juices processing
- (c) Explain the theory of filtration
5. (a) Briefly explain the applications of membrane concentration in food processing
- (b) A filtration test was carried out on a laboratory filter press at a pressure of 290 k Pa.

The volume of filtrate was collected as follows for a 1.5 h cycle:

Time (min)	7.5	30.4	50	90
Volume of filtrate ( $\text{m}^3$ )	1.8	3.8	4.9	6.8

The area of the laboratory filter was  $0.186 \text{ m}^2$  and the fractional volume of the filter cake was 0.15. Calculate:

- i. the specific resistance of filter cake and

- ii. the volume of filtrate that would be obtained if the cycle time were reduced to 45 min. (assume that the cake is incompressible and the viscosity of the filtrate is  $1.33 \times 10^{-3} \text{ N s m}^{-2}$ .)
- 6 (a) Material balancing is more straightforward than energy balance in food process engineering? Discuss.
- (b) Derive the dimensional equation for the following:
- i. Pressure
  - ii. Viscosity
  - iii. Heat transfer coefficient
  - iv. Specific heat capacity
  - v. Power
- (c) What are the desirable characteristics of sorted foods.

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**Second Semester 2006/2007 Session**

**December, 2007**

**FST 304:** Food Microbiology

**Time Allowed:** 2½ Hrs.

**INSTRUCTION**

- (i)** *Candidates should attempt four (4) questions only*
- (ii)** *This question paper should not be transferred to any other candidate during the examination session.*

1. (a) When is water said to be portable?
- (b) Explain the rationale for bacteriological analyses of water
- (c) Describe a method of analysis that could be employed to detect coliform organism from stream water.



2. (a) Assuming you are the Chief Health Officer of a state that has recently constructed a modern abattoir that butchers have refused to use on religious grounds, how will you convince the butchers of the advantages of using such an abattoir.
- (b) Discuss with reasons why the *botulinum* toxin has been described as the most dangerous toxin known to man and how it can be controlled.
3. Write short notes on at least seven (7) of the ten (10) least wanted food borne pathogens.
4. (a) Describe the Eijkman method for rapid detection of *E. coli*
- (b) Explain the relative specificity of indicator groups of organisms
- (c) Explain with reasons why experimentation with anthrax as a biological weapon has been quite common.
5. (a) Discuss the different types of spoilage associated with raw milk.
- (b) What are the various roles of the organisms employed in butter manufacture?
- (c) How can spoilage of butter be controlled?

**UNIVERSITY OF AGRICULTURE, ABEOKUTA**

COLLEGE OF AGRICULTURAL MANAGEMENT, RURAL DEVELOPMENT AND CONSUMER  
STUDIES

**DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY**

**B.Sc. Degree Examinations**

**Second Semester 2006/2007 Session**

**December, 2007**

**FST 318:** Food Engineering Applications

**Time Allowed:** 2 Hrs.

**INSTRUCTION**

*(i) Answer any four (4) questions*

*(ii) This question paper should not be transferred to any other candidate during the examination session.*

1. (a) List relevant factors that could affect the following:
    - (i) Drying rate of food stuff
    - (ii) Thermal conductivity of foodstuff.
  - (b) What is the difference between the following:
    - (i) In-can processing and ultra-high temperature processing
    - (ii) Laminar flow and turbulent flow
  - (c) Draw a typical drying curve and identify the major points.
  - (d) When does water diffusivity in a material influence its drying rate?
- 
2. (a) If a whole milk is flowing into a centrifuge through a full 5cm diameter pipe at a velocity of  $0.22\text{ms}^{-1}$  and if in the centrifuge it is separated into cream of specific gravity 1.01 and skim milk

of specific gravity 1.04, calculate the velocities of flow of milk and of the cream if they are discharge through 2cm diameter pipes. The specific gravity of whole milk is 1.035.

- (b)
    - (i) Define viscosity
    - (ii) List equipments for measuring viscosity.
  - (c) Graphically explain Newtonian and Non-Newtonian fluids.
3. (a) List and explain briefly the ways by which retorting (heating process) can be achieved in thermal processing.
- (b) What are the characteristics of equipments for ultra-high temperature processing.
- (c) Define the following:
- (i) Decimal reduction time (D)
  - (ii) Thermal resistance constant (Z)
  - (iii) Spoilage probability
  - (iv) Reynold's number
4. (a) Estimate the drying rate and time needed to reduce the moisture content of a 100 $\mu$ m diameter spherically shaped droplet falling in a spray dryer from 60 to 35%. The initial density of the droplet is 900kg/m<sup>3</sup>. The droplet is in an air stream such that  $T_{\infty} = 200^{\circ}\text{C}$ ,  $h = 200\text{W}/\text{m}^2\text{C}$ ,  $T_s = 60^{\circ}\text{C}$ ,  $P = 101.3\text{kpa}$  and  $h_{fg} = 2370.7\text{KJ}/\text{kg}$ . Assume that a constant rate drying rate applies over the total drying process.
- (b) List five (5) types of dryers.
- (c) Describe one of the dryers mentioned above
- (d) Compare the efficiencies of drying and evaporation.
5. (a) Sketch with description, drying rate versus time for a typical food product (slab material) being dried via conducting heat transfer in a drum dryer.
- (b) Why are very short drying times obtained with a spray dryer.
- (c) Name three parameters that would be important in the operation of a drum dryer.

- (d) Estimate the air flow rate required to remove 100kg/h of moisture produce by a drum dryer where the room is maintained at 30°C and the partial pressure of vapour in the outside air is 0.71KPa, the absolute humidity of the outside air entering is 0.004kg H<sub>2</sub>O/kg dry air and exiting the building is 0.02kgH<sub>2</sub>O/kg dry air.

**UNIVERSITY OF AGRICULTURE, ABEOKUTA**

**COLLEGE OF FOOD SCIENCE AND HUMAN ECOLOGY**

**DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY**

**B.Sc. Degree Examinations**

**Second Semester 2009/2010 Session**

**October, 2010**

**FST 306: Principles of Sensory Evaluation**

**Time: 2 Hrs.**

**Answer any four (4) questions**

- 1 (a) Enumerate the components of the following sensory attributes:
- (i) Appearance. (5 marks)
  - (ii) Consistency and Texture. (5)
- (b) Explain how these attributes influence food quality assessment and consumer acceptance. Give appropriate examples. (15 marks)
- 2 (a) Explain the mechanisms of perception for the following sensory modality:
- (i) Olfaction (10 marks)
  - (ii) Gustation (10 marks)
- (b) What do you understand by the Trigeminal factors? (5 marks)
- 3 (a) What sensory test would be appropriate for the following objectives:
- (i) To determine the degree of acceptance of a new beverage formulated with coconut milk. (5 marks)

- (ii) To select the most preferred sample from 2 formulations of cassava cake.  
(5 marks)
  - (b) Describe the procedure for the tests you have selected in a (i) and (ii) detailing the number of panelists, questionnaires etc. ( $7\frac{1}{2} \times 2 = 15$  marks)
4. Imagine that you have just been employed as the Quality Control Manager of a Food Processing factory. Your first assignment is to establish a sensory laboratory for the company.
- (a) Write in details, the design and materials you would recommend in your proposal. (15 marks).
  - (b) What specific controls would you ensure to be in place for a functional sensory laboratory? (10 marks).
5. Write short notes on the following:
- (a) Measurement scales in Sensory Evaluation (10 marks)
  - (b) Error of expectation. (5 marks)
  - (c) Error of Order of Presentation. (5 marks)
  - (d) Halo effect. (5 marks)

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**DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY**

**B.Sc. Degree Examinations**

**Second Semester 2009/2010 Session**

**October, 2010**

**FST 304: Food Microbiology**

**Time: 2hours**

**Instruction**

**Candidates should attempt all questions**

1. Anthrax is an infections often fatal disease associated with -----
2. Experimentation with anthrax as a ----- has been very common.
3. The onset of salmonellosis is ----- hours after eating.
4. *Campylobacter jejuni* produces ----- types of diarrhea.
5. The Guillain-Barre syndrome is caused by -----.
6. *Shigella* species had ----- pathogenic species.
7. The symptoms of shigellosis are -----.
8. *Listeria monocytogenes* is ubiquitous but not -----.
9. Enteropathogenic *E. coli* produces sporadic cases of -----diarrhea.
10. -----is the causative agent of Hemolytic Uremic Syndrome (HUS).
11. *Staphylococcus aureus* is part of the normal human skin and -----.

12. *Toxoplasma gondii* is a serious protozoal disease of the ----- and developing foetus.
13. ----- group of microorganisms are related to the *Pseudomonas*.
14. *Streptococcus pyogenes* causes sore throat and -----.
15. The representative genera of Enterococcus group are ----- and -----.
16. ----- are found on the surfaces of plants.
17. ----- is found in milk.
18. The *Micrococcus* are characterized by the production of -----.
19. The ----- are important spoilers of chilled milk.
20. The Actinomycetes are intermediate group between the bacteria and -----.
21. ----- are important in the production of Cephalosporium "C".

/2

-2-

22. The *Aspergillus* species are important in the production of ----- and ----- acids.
23. Most reliable indicators tend to be ----- specific.
24. The direct search for the presence of specific pathogens or viruses in water is -----  
-----
25. The MPN/Multiple tube method is also known as the ----- method.
26. The Multiple tube test consists of -----, ----- and -----  
- tests.



27. The membrane filter coliform test cannot be used for water or liquid containing matter -----  
----- matter.
28. ----- grows at 45°C in the presence of 40% Bile and Sodium azide.
29. ----- is the used water supply of homes, community or industries.
30. Microbial contamination in air exist as ----- particle.
31. All food borne diseases are classified as ----- and -----.
32. ----- has often been involved in the transmission of Shigellosis.
33. *Shigella dysenteriae* may produce severe ----- ending in collapse.
34. *C. perfringens* infects wounds causing -----.
35. The botulism toxins affects the ----- nerves of the automatic system at the point of synapses.
36. ----- antiviron toxin can be caused to control botulism.
37. The causative agent of Vibriosis is -----.
38. Cholera is characterized by diarrhea with -----.
39. The EPEC *E. coli* is otherwise known as -----.
40. 14 Mycotoxins are carcinogenic with ----- being the most potent.
41. ----- is the dinoflagellate responsible for the transmission of toxins to Mussels, Clamps and Oysters or Cockles.
45. ----- produces gas from glucose at 44°C.
46. The tube combination for water of doubtful quality is -----.
47. Sewage polluted waters may contain viruses of -----.
48. The ----- are used for the saccharification of starch and organic acids.
49. *P. fluorescence* impacts -----pigments to eggs.

50. The *Pediococcus* species are important in beers spoilage because they can produce-----

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**DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY**

**B.Sc. Degree Examinations**

**Second Semester 2009/2010 Session**

**October, 2010**

**FST 310: Food Rheology**

**Time: 2hours 15 mins.**

**Instruction**

1. a. What is food rheology?  
b. Explain how food rheology is related with food texture.  
c. Why is it important to study food texture and rheology?  
d. Define the following textural attributes and give two examples of food materials or products in which the attributes are intense: firmness, stickiness, hardness, juiciness
  
2. a. Using graphical sketches, describe the behavior of Newtonian and non-Newtonian fluids. List two examples of each.

- b. Using some illustrations, compare the behavior of Viscous and Visco-elastic fluids during mixing and passing through a pipe.
3. a. Using relevant schematic diagrams, describe the various types of forces that could cause deformation of food particles.
- b. List three examples of empirical testing instruments and their application in food quality testing.
- c. List two examples of food that undergo reversible and irreversible deformation.
4. a. Enumerate various factors that affect rheological behavior of fluid foods
- b. Consider the rheological models listed below:

$$\sigma = K \dot{\gamma}^n \quad (1)$$

$$\sigma = \eta \dot{\gamma} \quad (2)$$

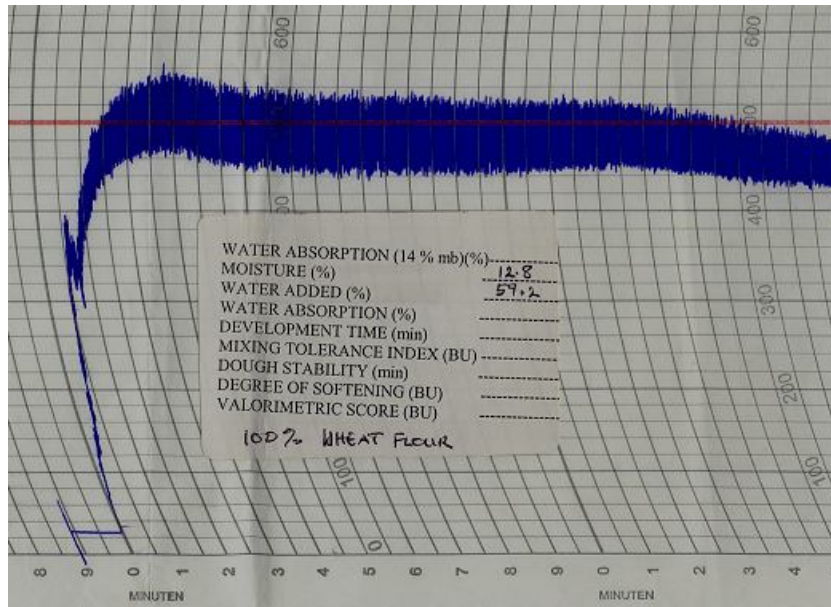
$$\sigma = \sigma_0 + K \dot{\gamma}^n \quad (3)$$

- i. Give the appropriate names given to each model.
- ii. Define each term in the model with their appropriate SI units.
- iii. To what type of fluid is each applicable?
5. a. What is Arrhenius equation and why is it important in the study of food rheology?
- b. Write out all the parameters in Arrhenius equation and their SI Units.
- c. The data below describes the power law parameter for concentrated orange juice at four temperatures. Calculate the activation energy for the flow of the juice.

Table 1: Power law parameters for concentrated orange

Temperature (°C)	K
-18.8	24.37
-5.4	6.45
9.5	2.25
29.2	0.69

6. a. Consider the diagrams shown below, answer the following questions:
- i. What rheological instrument was used in generating the graphs?
- ii. Estimate the values of the following parameters from the two graphs: Arrival time, dough development time and dough stability



- b. The table below show the values of parameters determined for some baking flour dough in a rheological instrument.
- What instrument was used to generate the data?
  - What quality of flour is determined by this instrument?
  - Define each parameter with their appropriate units
  - Which flour is best for baking bread and given reason(s) for your answer?

Quality Parameters	Flour A	Flour B	Flour C	Flour D
W	266	201	257	346
P <sub>max</sub>	110	125	124	102
L	60	37	51	84
P/L	1.83	3.38	2.43	1.21
G	17.2	13.5	15.9	20.4

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**Second Semester 2009/2010 Session**

**October, 2010**

**FST 316:** Chemical and Instrumental Analysis of food

**Time:** 2hours

**Instruction**

**Answer question one (1) and any two (2) questions**

1. A  $\text{H}_2\text{SO}_4$  solution of density 1.802g/ml contains 88%  $\text{H}_2\text{SO}_4$  by weight. Find:
- (i) The weight of  $\text{H}_2\text{SO}_4$  per litre of the solution.
  - (ii) The molarity of the  $\text{H}_2\text{SO}_4$  solution.
  - (iii) The volume of the  $\text{H}_2\text{SO}_4$  in (ii) that is required to prepare 3.0 litres of 6.0M solution.
  - (iv) The molality of  $\text{H}_2\text{SO}_4$  in (ii) above
  - (v) The mole fraction of  $\text{H}_2\text{O}$  and  $\text{H}_2\text{SO}_4$  in (iii) above.

(30 marks)

- 2 (a) With the aid of diagrams, explain the principle of Colorimetry. (15 marks).
- (b) What are the advantages of TLC? (5 marks).

- 3 (a) The choice of method(s) used for the analysis of food is dependent on a number of factors. Highlight these factors. (10 marks).
- (b) List and explain the more significant types of titrations used in food analysis. (10 marks).
- 4 (a) Define Beer-Lambert Law. (5 marks)
- (b) Explain the principles and methods of Chromatographic separations. (15 marks)

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**B.Sc. Degree Examinations**

**Second Semester 2009/2010 Session**

**October, 2010**

**FST 314: Principles of Food Analysis**

**Time: 2hours**

**Instruction**

**Answer any three (3) Questions**

- 1 (a) List five methods of protein determination apart from Kjeldahl's method and explain one of them in details. (10 marks)
- (b) Explain the determination of fat in milk using the Mojonnier method (10 marks)

2 (a) List and explain one method of moisture content determination of a named food (10 marks).

(b) Calculate the moisture content and dry matter of a food sample provided the following:

Wt of dish + lid = 40.00g

Wt of dish + lid + sample before drying = 520.00g

Wt of dish + lid + sample after drying = 210.00g

(10 marks)

3 (a) List four methods for determining available carbohydrates in foods (4 marks).

(b) Differentiate between Systematic errors and Random errors. (5 marks)

(c) List three (3) apparatus and three (3) reagents involved in fat determination using Wernerschimid's method. (6 marks).

(d) List the components that are measured in the proximate analysis of food. (5 marks).

4 (a) A number of steps and precautions may be undertaken to avoid many of the errors inherent in the equipment or procedure of analysis and to improve the reliability of data produced. Highlight these factors. (12 marks).

(b) (i) Describe the method of Ash content determinations. (8 marks).

(ii) State two (2) precautions in b<sub>i</sub> above (2 marks).

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**DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY**

**B.Sc. Degree Examinations**

**Second Semester 2009/2010 Session**

**October, 2010**

**FST 318: Food Engineering Applications**

**Time: 2hours 15 mins.**

**Instruction**

**Answer any four (4) Questions**

- 1 (a) Define the following terms:
- (i) Food dehydration
  - (ii) Pick-up efficiency
  - (iii) Water activity
  - (iv) Bound water
  - (v) Viscous drag
  - (vi) Stress
  - (vii) Viscosity
  - (viii) Decimal reduction time
  - (ix) Spoilage probability
  - (x) Reynolds number
- (b) Why is stainless steel used for most food pipelines.
- 2 (a) What are the four basic components of a liquid transport system?
- (b) Explain pump requirements in pump selection.
- (c) Oil flows through a pipe which contracts from 450 mm diameter at A to 300 mm diameter at B and then forks one branch being 200mm discharging at C and the other branch 175mm diameter discharging at D. If the velocity at A is 2.1mls and velocity at D is 3.4mls, what will be the discharge at C and D and the velocity at B and C?
- 3 (a) Explain the principles of drying theory.
- (b) What are the effects of drying on the nutritional values of food?

(c) List the various types of dryers and pumps you know.

4. What are the differences between the following:

- (i) Laminar flow and turbulent flow
- (ii) Centrifugal pump and positive displacement pump.
- (iii) Normal stress and shear stress
- (iv) In-can processing and Aseptic processing.
- (v) A typical drying curve and a typical drying rate curve.

5 (a) Describe the Osborne Reynolds experiment showing the relationship between Reynolds number and types of fluid flow.

(b) What is thermal resistance constant?

The thermal resistance constant of a spore suspension was  $11^{\circ}\text{C}$ , the decimal reduction time (D) of the suspension at a temperature of  $105^{\circ}\text{C}$  is 27.5 min. Calculate the D value at  $115^{\circ}\text{C}$ .

(c) List the relevant factors that could affect the following:

- (i) Heat and mass transfer rate
- (ii) Thermal conductivity of food stuff.

**UNIVERSITY OF AGRICULTURE, ABEOKUTA**  
**DEPARTMENT OF NUTRITION AND DIETETICS**  
**2007/2008 FIRST SEMESTER EXAMINATION**

**COURSE:** COMMUNITY NUTRITION I(NUT 305)

**INSTRUCTION:** ANSWER ALL QUESTIONS IN SECTION A AND ANY TWO (2) QUESTIONS IN SECTION B

**TIME ALLOWED:** 2 HOURS

**SECTION A**

1. Explain the following terms as used in community nutrition
  - (a) Growth velocity
  - (b) Complementary period
  - (c) Over nutrition
  - (d) Under nutrition
  - (e) Stunting
  - (f) Waisting
  - (g) Micrinutrient
  - (h) Adequate diet
  - (i) Exclusive breastfeeding
  - (j) Nutritional status
2. Outline the factors that affect food availability in your community
3. Mention the causes of poor weight gain during pregnancy
4. What are the unique features of a growth chart?

**SECTION B**

1. Discuss the causes of VAD in your community
2. The nutritional anemia has been identified as a significant public health problem. Discuss the causes and advice the community on the prevention.
3. Explain the advantages of Breastfeeding. What are the reasons for a decline in Breastfeeding duration?
4. What is EPM? Mention the different ways of managing a child with EPM. Give examples of EPM. List the common signs for each category of EPM.

**UNIVERSITY OF AGRICULTURE, ABEOKUTA**  
**DEPARTMENT OF NUTRITION AND DIETETICS**  
**2007/2008 FIRST SEMESTER EXAMINATION**

**COURSE:** RESEARCH METHODS IN NUTRITION (NUT 303)

**INSTRUCTION:** ANSWER QUESTION ONE (1) COMPULSORY AND ANY OTHER TWO (2) QUESTIONS

**TIME ALLOWED:** 2 HOURS

1.
  - a. What do you understand by Proximate Compositions of foods? Highlight the Proximate compositions in food
  - b. Of what importance is moisture in food analysis?
  - c. Explain the usefulness of animal model in modern nutrition research
2. Write short notes on the following:
  - a. Pilot study
  - b. Literature review
  - c. Coding
  - d. Focus
  - e. Stratified sampling method
3.
  - a. What does Nutrition Research involve?
  - b. Explain the steps in the Research process.
4.
  - a. What are Research Hypotheses?
  - b. Explain the errors in testing hypotheses.

**UNIVERSITY OF AGRICULTURE, ABEOKUTA**  
**DEPARTMENT OF NUTRITION AND DIETETICS**  
**2007/2008 FIRST SEMESTER EXAMINATION**

**COURSE:** HUMAN NUTRITION (NUT 301)

**INSTRUCTION:** ANSWER ANY THREE (3) QUESTIONS

**TIME ALLOWED:** 2 HOURS

1.
  - a. Why is Iodine deficiency disorders regarded as an environmental problems?
  - b. Highlight the relationship between malnutrition and infection.
  
2. Write short notes on the following:
  - a. Substances that chelate minerals
  - b. Nutritional anemia
  - c. Xerophthalmia
  - d. Endemic goiter
  - e. Starvation
  
3.
  - a. Highlight the various uses and limitations of food composition table
  - b. What are the nutritional goals of diabetes mellitus.
  
4.
  - a. Emmerate the various food groups with examples
  - b. What is Quetelet's index? What are they use for?
  - c. State five (5) clinical manifestation of protein energy malnutrition (PEM)

**UNIVERSITY OF AGRICULTURE, ABEOKUTA**  
**DEPARTMENT OF NUTRITION AND DIETETICS**  
**2009/2010 FIRST SEMESTER EXAMINATION**

**COURSE:** RESEARCH METHODS IN NUTRITION AND DIETETICS (NTD 303)

**INSTRUCTION:** ANSWER TWO QUESTIONS IN ALL QUESTION THREE (3) IS COMPULSORY

**TIME ALLOWED:** 2 HOURS

1. Explain the following as used in Nutrition and Dietetics Research
  - Stratification
  - Hypothesis
  - Validity
  - Variables
  - Data
  - Population
  - Accuracy
  - Nutritional Epidemiology
  - Evaluation study
  - Trials study
  
2.
  - (a) List five points to consider in developing a framework for nutrition investigation?
  - (b) What is sample size?
  - (c) How do you determine sample size in nutrition survey?
  - (d) Mention the importance of literature review
  
3. Write short notes on each of the following
  - (a) Anthropometric measurement
  - (b) Biochemical assessment
  - (c) Clinical assessment
  - (d) 24-hour intake Recall

**UNIVERSITY OF AGRICULTURE, ABEOKUTA**  
**DEPARTMENT OF NUTRITION AND DIETETICS**  
**2009/2010 FIRST SEMESTER EXAMINATION**

**COURSE:** INSTITUTIONAL AND PERSONNEL MANAGEMENT IN FOOD SERVICE (NTD 305)

**INSTRUCTION:** SECTION A: ANSWER ALL QUESTIONS  
SECTION B: ANSWER ANY ONE (1) QUESTION

**TIME ALLOWED:** 1 HOUR 30MINS.

SECTION A

1. Write short notes on the types of foodservice systems.
2. Discuss the assessment of food quality

SECTION B

1.
  - a. Write short notes on any three (3) of the types of records used in stores control
  - b. Explain the main elements contain in the total cost of an item
2.
  - a. Why is control of goods from receipt (delivery) to final destination (the customer essential?)
  - b. Explain the terms: 'Backward' pricing and cost plus

**UNIVERSITY OF AGRICULTURE, ABEOKUTA**  
**DEPARTMENT OF NUTRITION AND DIETETICS**  
**2009/2010 FIRST SEMESTER EXAMINATION**

**COURSE:** HUMAN NUTRITION (NTD 301)

**INSTRUCTION:** SECTION A: ANSWER ALL QUESTIONS IN THE SPACE PROVIDED IN THE QUESTION PAPER  
SECTION B: ANSWER FOUR (4) QUESTIONS IN YOUR ANSWER SCRIPT

**TIME ALLOWED:** 1 ½ HOUR

MATRIC NO.: .....DEPT.....

**SECTION A**

1. Cereals are good sources of the following:  
(a) Energy and protein (b) Calcium and iron (c) Energy and vitamin  
(d) energy and B vitamins (e) Energy and Vitamin B6
2. The inner endosperm of a cereal contain a higher concentration of  
(a) B Vitamins (b) Protein (c) Fat (d) Starch (e) None of the above
3. The protein in milk mainly  
(a) Caseinogens and Lactalbumin (b) Prolactin and Lactose (c) Proclactin and Lactalbumin  
(d)Caseinogen and Lactalbumin (e) prolactin and Caseinogens
4. The limiting amino acid in maize is/are  
(a) Lysine (b) Tyrosine (c) Tryptophan (d) Lysine and Tryptophan  
(e) Lysine and Tyrosine
5. An important mineral present in fish but lacking in meat is  
(a) Calcium (b) Iodine (c) Iron (d) Magnesium (e) Zinc
6. Which of the following is not true of legumes?  
(a) Legumes are good sources of riboflavin and ascorbic acid  
(b) Legumes are limiting in methionine



- (c) Legumes have higher protein than cereals
  - (d) Legumes provide protein of good quality when combined with cereal
  - (e) None of the above
7. Milk is a very good source of the following EXCEPT  
 (a) Calcium (b) Protein (c) riboflavin (d) Vitamin A (e) Iron
8. The absorption of minerals from cereals is hindered by  
 (a) Pest (b) Trypsin (c) Iron (d) Phytic acid (e) Phenyl
9. Rickets is a nutritional disease caused by deficiency of  
 (a) Calcium (b) Lack of exposure to sunlight (c) Vitamin D (d) Bone deformity  
 (e) All of the above
10. The following are responsible for the variation in nutrient content of meat EXCEPT  
 (i) Fat (ii) Cut or portion of animal (iii) Nutrition of the animal (iv) Protein  
 (v) Food composition  
 (a) I, II and III (b) II, III, IV and V (c) IV and V (d) V (e) None
11. The following are true of sugar EXCEPT  
 (i) It is used as a flavouring agent  
 (ii) It is used as a preservative  
 (iii) It is a concentrated source of energy  
 (iv) It is a common cause of dental carries
12. I, III and IV (b) I, II and III (c) II, III and IV (d) III (e) None

Fill in the missing words/figure in Questions 11-20

13. A raised plasma cholesterol over a prolonged period of time may predispose to.....
14. A disease condition associated with milk consumption among adults in black population is.....
15. ....is the commonest cause of mental retardation among children.
16. Consumption of diets high in saturated fatty acids may predispose to.....
17. body mass index is calculated as .....
18. The system through which government could predict drought, low crop yield and plan to obtain External assistance is called.....
19. Using welcome classification, a child without oedema who weighs less than 60% of his expected

- Weight is suffering from.....
20. The best form of feeding for an infant less than 6 months is.....
  21. The combination of cereals and legumes in the diet to supply protein of comparable value to That of animal is referred to as.....
  22. The consequence of famine which has nutritional, health and psychological manifestations is .....
  23. Osteomalacia is a nutritional disease which occurs in adults due to lack of.....
  24. ....is a pathological condition in which lack of food consumption threatens or causes Death
  25. Enlargement of the thyroid gland is the most obvious clinical manifestation of.....

## SECTION B

Answer four (40 Questions in this section. You are advised to give concise answers only

- 1a. What is the nutritional implications of excessive rice milling on predominantly rice eating Communities
- b. What can be done to avert this nutritional problem?
2. Briefly describe food composition table and state 2 users and 2 limitations of food composition Table
3. List 3 naturally occurring toxicants in food, where found and their effects.
4. State the nutritional contributions of fruits and vegetables to the diet
5. List 2 micronutrient deficiency diseases of public health importance in Nigeria and state 2 causes and preventive methods of each.
6. A child aged 18 months was found to weight below 70% of his expected weight. Further Observation revealed presence of oedema.
  - a. What nutritional disease is the child suffering from and list 3 other clinical features of the disease
  - b. State 3 causes of the disease and briefly explain how it can be treated.

**UNIVERSITY OF AGRICULTURE, ABEOKUTA**  
**DEPARTMENT OF NUTRITION AND DIETETICS**  
**2007/2008 FIRST SEMESTER EXAMINATION**

**COURSE:** COMMUNITY NUTRITION I(NUT 305)

**INSTRUCTION:** ANSWER ALL QUESTIONS IN SECTION A AND ANY TWO (2) QUESTIONS IN SECTION B

**TIME ALLOWED:** 2 HOURS

**SECTION A**

1. Explain the following terms as used in community nutrition
  - (a) Growth velocity
  - (b) Complementary period
  - (c) Over nutrition
  - (d) Under nutrition
  - (e) Stunting
  - (f) Waisting
  - (g) Micrinutrient
  - (h) Adequate diet
  - (i) Exclusive breastfeeding
  - (j) Nutritional status
2. Outline the factors that affect food availability in your community
3. Mention the causes of poor weight gain during pregnancy
4. What are the unique features of a growth chart?

**SECTION B**

1. Discuss the causes of VAD in your community
2. The nutritional anemia has been identified as a significant public health problem. Discuss the causes and advice the community on the prevention.
3. Explain the advantages of Breastfeeding. What are the reasons for a decline in Breastfeeding duration?
4. What is EPM? Mention the different ways of managing a child with EPM. Give examples of EPM. List the common signs for each category of EPM.

**UNIVERSITY OF AGRICULTURE, ABEOKUTA**  
**DEPARTMENT OF NUTRITION AND DIETETICS**  
**2007/2008 FIRST SEMESTER EXAMINATION**

**COURSE:** RESEARCH METHODS IN NUTRITION (NUT 303)

**INSTRUCTION:** ANSWER QUESTION ONE (1) COMPULSORY AND ANY OTHER TWO (2) QUESTIONS

**TIME ALLOWED:** 2 HOURS

1.
  - a. What do you understand by Proximate Compositions of foods? Highlight the Proximate compositions in food
  - b. Of what importance is moisture in food analysis?
  - c. Explain the usefulness of animal model in modern nutrition research
  
2. Write short notes on the following:
  - a. Pilot study
  - b. Literature review
  - c. Coding
  - d. Focus
  - e. Stratified sampling method
  
3.
  - a. What does Nutrition Research involve?
  - b. Explain the steps in the Research process.

4.
  - a. What are Research Hypotheses?
  - b. Explain the errors in testing hypotheses.

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**DEPARTMENT OF NUTRITION AND DIETETICS**  
**2007/2008 FIRST SEMESTER EXAMINATION**

**COURSE:** HUMAN NUTRITION (NUT 301)

**INSTRUCTION:** ANSWER ANY THREE (3) QUESTIONS

**TIME ALLOWED:** 2 HOURS

1.
  - a. Why is Iodine deficiency disorders regarded as an environmental problems?
  - b. Highlight the relationship between malnutrition and infection.
  
2. Write short notes on the following:
  - a. Substances that chelate minerals
  - b. Nutritional anemia
  - c. Xerophthalmia
  - d. Endemic goiter
  - e. Starvation
  
3.
  - a. Highlight the various uses and limitations of food composition table
  - b. What are the nutritional goals of diabetes mellitus.
  
4.
  - a. Emmerate the various food groups with examples
  - b. What is Quetelet's index? What are they use for?
  - c. State five (5) clinical manifestation of protein energy malnutrition (PEM)

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**2009/2010 FIRST SEMESTER EXAMINATION**

**COURSE:** RESEARCH METHODS IN NUTRITION AND DIETETICS (NTD 303)

**INSTRUCTION:** ANSWER TWO QUESTIONS IN ALL QUESTION THREE (3) IS COMPULSORY

**TIME ALLOWED:** 2 HOURS

1. Explain the following as used in Nutrition and Dietetics Research
  - Stratification
  - Hypothesis
  - Validity
  - Variables
  - Data
  - Population
  - Accuracy
  - Nutritional Epidemiology
  - Evaluation study
  - Trials study
  
2.
  - (a) List five points to consider in developing a framework for nutrition investigation?
  - (b) What is sample size?
  - (c) How do you determine sample size in nutrition survey?
  - (d) Mention the importance of literature review
  
3. Write short notes on each of the following
  - (a) Anthropometric measurement
  - (b) Biochemical assessment
  - (c) Clinical assessment
  - (d) 24-hour intake Recall

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**DEPARTMENT OF NUTRITION AND DIETETICS**  
**2009/2010 FIRST SEMESTER EXAMINATION**

**COURSE:** INSTITUTIONAL AND PERSONNEL MANAGEMENT IN FOOD SERVICE (NTD 305)

**INSTRUCTION:** SECTION A: ANSWER ALL QUESTIONS  
SECTION B: ANSWER ANY ONE (1) QUESTION

**TIME ALLOWED:** 1 HOUR 30MINS.

**SECTION A**

1. Write short notes on the types of foodservice systems.
2. Discuss the assessment of food quality

**SECTION B**

1.
  - a. Write short notes on any three (3) of the types of records used in stores control
  - b. Explain the main elements contain in the total cost of an item
2.
  - a. Why is control of goods from receipt (delivery) to final destination (the customer essential?)
  - b. Explain the terms: 'Backward' pricing and cost plus



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**2009/2010 FIRST SEMESTER EXAMINATION**

**COURSE:** HUMAN NUTRITION (NTD 301)

**INSTRUCTION:** SECTION A: ANSWER ALL QUESTIONS IN THE SPACE PROVIDED IN THE QUESTION PAPER  
SECTION B: ANSWER FOUR (4) QUESTIONS IN YOUR ANSWER SCRIPT

**TIME ALLOWED:** 1 ½ HOUR

MATRIC NO.: .....DEPT.....

**SECTION A**

1. Cereals are good sources of the following:  
(a) Energy and protein (b) Calcium and iron (c) Energy and vitamin  
(d) energy and B vitamins (e) Energy and Vitamin B6
2. The inner endosperm of a cereal contain a higher concentration of  
(a) B Vitamins (b) Protein (c) Fat (d) Starch (e) None of the above
3. The protein in milk mainly  
(a) Caseinogens and Lactalbumin (b) Prolactin and Lactose (c) Proclactin and Lactalbumin  
(d)Caseinogen and Lactalbumin (e) prolactin and Caseinogens
4. The limiting amino acid in maize is/are  
(a) Lysine (b) Tyrosine (c) Tryptophan (d) Lysine and Tryptophan  
(e) Lysine and Tyrosine
5. An important mineral present in fish but lacking in meat is  
(a) Calcium (b) Iodine (c) Iron (d) Magnesium (e) Zinc
6. Which of the following is not true of legumes?  
(a) Legumes are good sources of riboflavin and ascorbic acid  
(b) Legumes are limiting in methionine

- (c) Legumes have higher protein than cereals
  - (d) Legumes provide protein of good quality when combined with cereal
  - (e) None of the above
7. Milk is a very good source of the following EXCEPT  
 (a) Calcium (b) Protein (c) riboflavin (d) Vitamin A (e) Iron
8. The absorption of minerals from cereals is hindered by  
 (a) Pest (b) Trypsin (c) Iron (d) Phytic acid (e) Phenyl
9. Rickets is a nutritional disease caused by deficiency of  
 (a) Calcium (b) Lack of exposure to sunlight (c) Vitamin D (d) Bone deformity  
 (e) All of the above
10. The following are responsible for the variation in nutrient content of meat EXCEPT  
 (i) Fat (ii) Cut or portion of animal (iii) Nutrition of the animal (iv) Protein  
 (v) Food composition  
 (a) I, II and III (b) II, III, IV and V (c) IV and V (d) V (e) None
11. The following are true of sugar EXCEPT  
 (i) It is used as a flavouring agent  
 (ii) It is used as a preservative  
 (iii) It is a concentrated source of energy  
 (iv) It is a common cause of dental carries
12. I, III and IV (b) I, II and III (c) II, III and IV (d) III (e) None

Fill in the missing words/figure in Questions 11-20

13. A raised plasma cholesterol over a prolonged period of time may predispose to.....
14. A disease condition associated with milk consumption among adults in black population is.....
15. ....is the commonest cause of mental retardation among children.
16. Consumption of diets high in saturated fatty acids may predispose to.....
17. body mass index is calculated as .....
18. The system through which government could predict drought, low crop yield and plan to obtain External assistance is called.....
19. Using welcome classification, a child without oedema who weighs less than 60% of his expected

- Weight is suffering from.....
20. The best form of feeding for an infant less than 6 months is.....
  21. The combination of cereals and legumes in the diet to supply protein of comparable value to That of animal is referred to as.....
  22. The consequence of famine which has nutritional, health and psychological manifestations is .....
  23. Osteomalacia is a nutritional disease which occurs in adults due to lack of.....
  24. ....is a pathological condition in which lack of food consumption threatens or causes Death
  25. Enlargement of the thyroid gland is the most obvious clinical manifestation of.....

## SECTION B

Answer four (40 Questions in this section. You are advised to give concise answers only

- 1a. What is the nutritional implications of excessive rice milling on predominantly rice eating Communities
- b. What can be done to avert this nutritional problem?
2. Briefly describe food composition table and state 2 users and 2 limitations of food composition Table
3. List 3 naturally occurring toxicants in food, where found and their effects.
4. State the nutritional contributions of fruits and vegetables to the diet
5. List 2 micronutrient deficiency diseases of public health importance in Nigeria and state 2 causes and preventive methods of each.
6. A child aged 18 months was found to weight below 70% of his expected weight. Further Observation revealed presence of oedema.
  - a. What nutritional disease is the child suffering from and list 3 other clinical features of the disease
  - b. State 3 causes of the disease and briefly explain how it can be treated.