UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

DIPLOMA IN ENVIRONMENTAL HEALTH
FINAL EXAMINATION PAPER 2013

TITLE OF PAPER	:	FOOD SAFETY & PRESERVATION
COURSE CODE	:	EHS 313
DURATION	:	2 HOURS
MARKS	:	100

INSTRUCTIONS	:	ANSWER **ONLY FOUR** QUESTIONS
	:	QUESTION **ONE IS COMPULSORY**
	:	EACH QUESTION CARRIES 25 MARKS.
	:	READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
	:	BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

Question 1

Multiple Choice Questions
(Choose the Best Answer)

1. Reduction of water content in liquid foods without conversion to a dry state is known as:
    A. concentration
    B. condensation
    C. evaporation
    D. extraction
    E. sublimation

2. The temperature range considered safe for holding highly perishable foods is;
    A. below 5 deg C or above 55 deg C
    B. below 8 deg C or above 60 deg C
    C. below 10 deg C or above 55 deg C
    D. below 5 deg C or above 60 deg C
    E. above 0 deg C or below 60 deg C

3. Reports of foodborne disease indicate that the implicated food was usually;
    A. a canned food
    B. a food held for long periods at room temperatures.
    C. an improperly cooked food
    D. a food stored too long in the refrigerator
    E. a food that has been handled by a sick food handler

4. Which of the following is not consistent with present knowledge of bacterial survival in frozen food?
    A. it is possible for food poisoning to occur from ingestion of a frozen product containing Staphylococcal toxins
    B. pathogenic bacteria may survive freezing, but freezing destroys their ability to multiply
    C. survival is affected by the speed and temperature of freezing
    D. some multiplication of bacteria may occur in bulky batches during the freezing process.
    E. in minced beef, salmonellae survived the freezing storage

5. Alternate partial thawing and freezing of foods under 5 deg C., results in a marked loss of quality. Which of the following statements is inconsistent with current knowledge about defrosting?
    A. defrost of any degree adversely affects the quality of frozen foods.
    B. observed loss in quality due to defrost is operative even when the numbers of microorganisms are low
    C. chemical and physical changes due to defrost take place which cannot be reversed
    D. refreezing will stop quality deterioration.
    E. the conditions during thawing and the time/temperature of holding after thawing are most important

6. Rapid heat transfer in cooking, cooling and thawing is important because a food should not remain in the danger zone too long. Which of the following would be most dangerous in the thawing out of frozen turkey?
    A. thawing at room temperature
    B. thawing under running water at 13.5 deg C
    C. thawing in a pan of water at room temperature
    D. thawing under refrigeration
    E. thawing under microwave oven

7. Which of the following has the longest recommended storage time at refrigeration (-1 to 2.5 deg C) temperatures
    A. beef
    B. pork
    C. chicken
    D. fish
    E. equal storage time

8. Ultra violet (UV) irradiation is most useful for killing microbes:
    A. in aerosols
    B. in air or on surfaces
    C. in milk
    D. in untreated water
    E. on surfaces of wet or greasy foods

9. The primary cause of lethality in microorganisms exposed to ionizing irradiation is:
    A. change in proteins
    B. damage to membranes
    C. damage to microbial DNA
    D. enzymes inactivation
    E. change in proteins and enzymes inactivation

10. Which one of these statements is **not correct**?

A. Sorbic acid has a selective antimicrobial activity
B. Sorbic acid is ineffective against catalase negative bacteria, molds and yeast
C. Chemical preservatives retard or prevent growth of undesirable microorganisms in unheated food products
D. Curing salts will alter the color, flavor, texture and number of microbes
E. Salt when used as food preservative, dehydrate the cytoplasm (plasmolysis) of microbial cell causing unfavorable osmotic gradient

11. Which one of the statements is **not correct**?

A. Too low temperature in storage of fruits and vegetables interferes with enzymatic system, allowing toxic substance build up resulting in pitting
B. Excess carbon dioxide during the storage fruits and vegetables result in chemical damage leading to brown heart in apples and pears.
C. Too low temperature may result in chilling injury in fruits and vegetables which may lead to woolen factor in peaches and khaki or brown color in bananas.
D. Proteins accounts for about 1% of a vegetable's composition, but can be as high as 4% in corn and 8% in legumes
E. Bacteria plays no role in the spoilage of fruits and vegetables, only molds and yeasts result in their spoilage.

12. Assume you prepared several batches of the same type of the salad under the same conditions, except that you added varying amounts of vinegar. In the salads with high vinegar content, you would expect;

A. a higher pH and a lower bacteria count
B. a lower pH and a lower bacteria count
C. a higher pH and a higher bacteria count
D. a lower pH and a higher bacteria count
E. a neutral pH and no change in bacteria count

13. A major disadvantage of ionizing irradiation of foods is that;

A. foods cannot be irradiated in frozen state
B. considerable heat is produced
C. enzymes in foods are not inactivated
D. residues of non food material are produced
E. mutagenic, teratogenic, carcinogenic, and toxic factors are induced in foods

14. Which of the following are most susceptible to injury at temperatures below 5deg C?

A. bacterial spores
B. gram-positive cocci
C. gram-positive rods
D. gram –negative rods
E. Psychrotrophs

15. In meat sausages, sodium nitrate and sodium chloride are added for the following reason; to

A. prevent the germination of *Clostridium botulinum* spores
B. destroy viable *Clostridium botulinum* spores
C. destroy viable *Clostridium botulinum* cells
D. destroy all viable spores in sausages except *Clostridium botulinum* spores
E. B and C

16. Avidin and lysozyme are intrinsic antimicrobial substances that are found in:

A. garlic
B. sour milk
C. citrus fruits
D. eggs
E. B and D

17. Benzoic acid cannot be relied on to preserve food that is capable of supporting bacterial growth because:

A enterobacteriaceae are resistant to it
B many spoilage bacteria are quite resistant to it
C it is too toxic
D many spore-forming bacteria readily germinate in solutions of benzoate ions
E. none of the above

18. Very high intensity radiation with great penetrating power produced during decay of ^{60}Co is:

A. α radiation
B. β radiation
C. γ radiation
D. UV radiation
E. α radiation and β radiation

19. Factors that cause inhibition and death of microorganisms in the carbonated beverages are;

A. carbon dioxide and low pressure
B. carbon dioxide and pH
C. pH and water activity
D. reduced oxidation-reduction potential and water activity
E. water activity and sugar content

20. Which one of these groups may be used for the decontamination of shelled eggs
    A. Carbon monoxide
    B. Ethylene oxide
    C. Formaldehyde
    D. Methyl bromide
    E. Sulfur dioxide

21. The preservation and safety of cured food is the result of:
    A. processing and storage temperature
    B. the nitrite level
    C. the salt concentration.
    D. the water activity.
    E. interaction of many factors

22. Which of these foods would be expected to have the highest pH?
    A. tomatoes
    B. pineapples
    C. beef
    D. strawberry
    E. sweet potatoes

23. Based on pH alone, which organic acid would you choose to preserve a food that has a pH of 6.
    A. Benzoic acid
    B. Sorbic acid
    C. Parabens
    D. Propionic acid
    E. Lactic acid

24. Which of these foods has the lowest water activity (Aw)
    A. Canned fruit in heavy syrup
    B. Dried fruits
    C. Sweetened condensed milk
    D. Chocolate
    E. Straw berry jam

25. Once a can containing food has been opened and partially used.
    A. the remaining food should be discarded after 6 hours
    B. the remaining food becomes poisoned if left in the can
    C. the remaining food should be covered and refrigerated in the can
    D. the remaining food should not be eaten unless boiled for 30 minutes
    E. the remaining food can be eaten since the can is sterile and it was canned under hygienic conditions

[25 marks]

Question 2

a. There are intrinsic factors that play an important role in the safety of shelled eggs. Explain these factors. [5]

b. You open a canned solid packed cured meat product and you find that the surface of the meat has yellow or brown discoloration. What would have caused that? [4]

c. Demonstrate an understanding of the interrelationships between organic acids and pH. [5]

d. Using appropriate examples, explain why antioxidants are added in foods.[3]

e. Write short notes on dietetic beverages [5]

f. Rye-bread is very good for people who are dieting and slimming. Explain why? [3]

[25 marks]

Question 3

a. In the canning process of beef, explain the risk factors that are likely to result in foodborne illness. [10]

b. Explain the relationship of alcohol and impotence in man. [4]

c. Explain why carbon dioxide (CO_2) is added in soft drinks. [4]

d. What is a commercially sterile product? [3]

e. When you open a canned food product, you observe that there is a metallic taint on the surface of the food? Explain the cause. [4]

[25 marks]

Question 4

a. Demonstrate your understanding of the interrelationships of water activity and temperature in ensuring long shelf life of food. [10]

b. What is the cause of Maillard reaction in foods? [3]

c. You find bottled milk displayed on shelf and on the label is written "homogenization milk" what does that mean. [3]

d. Choose any three (3) measures that are necessary to ensure milk safety and explain how these factors contribute in making sure that the milk we consume will not cause food borne illness?. [9]

[25 marks]

Question 5

a. Show the relationship between time and temperature as related to the survival and growth of bacteria in foods. [5]

b. What is the effect of adding calcium sorbate salt to a mixed population of microorganism? [5]

c. list the objectives of pasteurization. How do these objectives differ from those used in commercial sterilization of foods? Use a food product in each case to justify your explanations. [6]

d. In what type of food would you add sodium nitrate and why? [5]

e. How does emasi or fermented milks preserve food? [4]

[25 marks]