



**UNIVERSITY OF SWAZILAND**  
**Faculty of Health Sciences**

**DIPLOMA IN ENVIRONMENTAL HEALTH**  
**FINAL EXAMINATION PAPER 2014**

<b>TITLE OF PAPER</b>	:	<b>FOOD SAFETY &amp; PRESERVATION</b>
<b>COURSE CODE</b>	:	<b>EHS 313</b>
<b>DURATION</b>	:	<b>2 HOURS</b>
<b>MARKS</b>	:	<b>100</b>
<b>INSTRUCTIONS</b>	:	<b>ANSWER ONLY FOUR QUESTIONS</b>
	:	<b>QUESTION ONE IS COMPULSORY</b>
	:	<b>EACH QUESTION CARRIES 25 MARKS.</b>
	:	<b>READ THE QUESTIONS &amp; INSTRUCTIONS CAREFULLY</b>
	:	<b>BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.</b>

**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. Reports of foodborne disease outbreaks indicate that the implicated food is 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
  
3. 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
  
4. 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
  
5. 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

6. 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, dehydrates the cytoplasm (plasmolysis) of microbial cell causing unfavorable osmotic gradient

7. 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 of 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 account for about 1% of a vegetable's composition, but can be as high as 4% in corn and 8% in legumes
- E. Bacteria play no role in the spoilage of fruits and vegetables, only molds and yeasts result in their spoilage.

8. 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

9. 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

- 10 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 ineffective against catalase-positive bacteria
  - D many spore-forming bacteria readily germinate in solutions of benzoate ions
  - E. it can used only to inhibit aerobic contaminants of fermented or acidulated foods
- 11 Very high intensity radiation with great penetrating power produced during decay of  $^{60}\text{Co}$  is:
- A.  $\alpha$  radiation
  - B.  $\beta$  radiation
  - C.  $\gamma$  radiation
  - D. UV radiation
  - E.  $\alpha$  radiation and  $\beta$  radiation
- 12 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
13. 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. *p*-hydroxybenzoic acid
  - D. acetic acid
  - E. Sodium propionate
14. Which of these foods has the lowest water activity ( $A_w$ )
- A. Canned fruit in heavy syrup
  - B. Dried fruits
  - C. Sweetened condensed milk
  - D. Chocolate
  - E. Straw berry jam

15. 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
16. In dry sausage spoilage would likely be caused by:
- A. Lactic acid bacteria
  - B. Osmophilic yeasts
  - C. *Pseudomonas* sp.
  - D. *Staphylococcus aureus*
  - E. All of the above are likely to cause spoilage
17. An organism that is unable to grow in a salt-free medium is known as;
- A. an osmophile
  - B. a salophile
  - C. a xerophile
  - D. a haloduric
  - E. a halophile
18. Which of these microorganisms is likely to grow at temperatures lower than 5 deg C?
- A. *Clostridium perfringens*
  - B. *Clostridium botulinum* type E
  - C. *Salmonella* species
  - D. *Staphylococcus aureus*
  - E. *Vibrio parahaemolyticus*
19. The effect of freezing bacteria is;
- A. to inactivate some; whereas others are sensitive to freezing, frozen storage, and thawing; others resist freezing but are susceptible to frozen storage; others are unharmed
  - B. to injure vegetative bacteria which can recover later
  - C. to kill vegetative cells but not spores
  - D. to stop their growth but not to kill them
  - E. nothing because they will survive freezing
20. Sensitivity to irradiation is highest in;
- A. aerobic atmosphere
  - B. anaerobic atmosphere
  - C. dry foods
  - D. foods which are anaerobic
  - E. frozen foods

21. Bakeries have found UV helpful in controlling microorganisms:
- A. in interiors of cream filled pies
  - B. in flour that stained by rodents urine
  - C. in air to prevent spread of viable microorganisms to surface of bread
  - D. in jam and jelly fillings
  - E. in proofers to accelerate fermentation
22. Avidin and lysozyme are intrinsic antimicrobial substances that are found in:
- A. garlic
  - B. eggs
  - C. milk
  - D. meat
  - E. fish
23. What is the primary factor in the preservation of fermented foods?
- A. acidity
  - B. alkalinity
  - C. heat
  - D. water activity
  - E. chemical preservatives
24. Egg white spoilage would most likely have been caused by which of these types of microorganisms?
- A. gram-positive cocci
  - B. gram-positive rods
  - C. gram-negative rods
  - D. molds
  - E. yeasts
25. During an inspection of a food wholesale store-room, you observe three blown canned vegetables. This condition would be more likely caused by which microorganism?
- A. *Aspergillus repens*
  - B. *Lactobacillus brevis*
  - C. *Torula stellata*
  - D. *Bacillus coagulans*
  - E. *Escherichia coli*

**[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. Demonstrate an understanding of the interrelationships between organic acids and pH. [4]
  - c. In Coca-Cola soft drink, sodium benzoate is the preservative of choice in Swaziland. Why is that so? [3]
  - d. How does low temperature preserve food? [5]
  - e. Rye-bread is very good for people who are dieting and slimming. Explain this. [3]
  - f. Explain the difference between "UHT" milk and pasteurized milk. [5]
- [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. Discuss the general effects of ultra violet light (UV) on microorganisms. [5]
  - c. Discuss the benefits derived from the use of low temperature preservation over the use of chemicals for preservation and all the other physical methods. [10]
- [25 marks]**

**Question 4**

- a. Discuss the relationships between 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 the shelf and on the label is written "homogenized milk" what does that mean. [3]
  - d. What does commercial sterility mean in food products? [4]
  - e. Why is wheat flour preferred in the production bread? [5]
- [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. In what type of food would you add sodium nitrate and why? [6]
- d. Salmonellosis is significantly associated with poultry meat and eggs. Why is this so? [6]
- e. Citrus fruits are usually spoiled by molds and yeasts. Explain the factors at play. [3]

**[25 marks]**