



UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

DIPLOMA IN ENVIRONMENTAL HEALTH
FINAL EXAMINATION PAPER 2010

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.

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READ THE QUESTIONS & INSTRUCTIONS
CAREFULLY

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: 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. 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. destroy all viable cells of *Staphylococcus aureus* and *Clostridium botulinum*

2. Which of the following are most susceptible to injury at low temperature?
 - A. bacterial spores
 - B. gram-positive cocci
 - C. gram-positive rods
 - D. gram-negative rods
 - E. psychrotrophs

3. If food was stored and held at a temperature below -5 deg C, which of these microbes could be expected to cause spoilage?
 - A. *Escherichia coli* change in proteins
 - B. *Pseudomonas aeruginosa*
 - C. *Cladosporium herbarum*
 - D. *Pseudomonas fluorescens*
 - E. *Staphylococcus aureus*

4. If a microorganism has a maximal temperature for growth at 25⁰ C, and a minimal temperature at 2⁰ C, and its optimal temperature at 15⁰ C, it is classified as a:
 - A. mesophile
 - B. psychrophile
 - C. psychrotroph
 - D. thermophile
 - E. None of the above

5. Which one of the statement 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 accounts for about 1% of a vegetable's composition, but can be as high as 4% in corn and 8% in legumes
 - E. Guavas have equal amount of vitamin C as in citrus fruits
6. Which one of these statements is **not correct**?
- A. Sorbic acid has a selective antimicrobial activity
 - B. Sorbic acid is ineffective against catalase positive 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 unfavourable osmotic gradient
7. Which one of these statements is **not correct** in relationship to coffee?
- A. The three species of coffee include *Coffea arabica*, *Coffea .robusta* or *canephora* and *Coffea liberica*
 - B. The finest coffee comes from *C. arabica* and has low caffeine content
 - C. *Coffea canephora* or *robusta* is a strong, high caffeine type but of inferior quality
 - D. Herbal teas are associated with therapeutic effects and many important vitamins
 - E. Decaffeinated coffee, contains less than 3mg of caffeine per 150 ml cup
8. A can of a food product has one bulging end. When the bulging end is pressed in, the other end bulges. What is this called?
- A. a springer
 - B. a cocker
 - C. a swell
 - D. a flipper
 - E. none of the above

9. 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
10. While the optimum storage temperature for frozen foods is -18°C , temperatures may rise above that level. For example, at -2°C , we expect;
- A. slow spoilage without danger to health
 - B. a complete die off of pathogenic organisms
 - C. some growth of pathogens
 - D. no psychrophilic growth
 - E. B and C are correct
11. Custards and cream filled pastries are especially adapted to foodborne disease transmission. Which of the following is consistent with proper handling of these products?
- A. they should be cooled to 5°C , within one hour after preparation
 - B. they may be displayed unrefrigerated for periods up to 4 hours
 - C. if stored at 5°C , they may be held indefinitely
 - D. all should be discarded after 6 hours regardless of how they are handled.
 - E. None of the above is correct
12. The temperature range considered safe for holding potentially hazardous foods is;
- A. below 5°C or above 55°C
 - B. below 8°C or above 60°C
 - C. below 10°C or above 55°C
 - D. below 5°C or above 60°C
 - E. below 0°C or above 100°C
13. If beef prepared from the semi tropics climate, another beef from cooler climate areas are stored in a chiller? Which beef would store longer in the chiller before spoilage?
- A. Beef from semi tropics
 - B. Beef from cooler climate
 - C. Equal storage duration
 - D. Will depend on the number of microbes
 - E. all of the above

14. Which of the following products require refrigerated vending machines?
- A. candy
 - B. crackers and cookies
 - C. cream filled pies
 - D. canned foods
 - E. none of the above
15. The menace of contaminated oysters is increasing because of;
- A. increased use of boats with on board toilets
 - B. decrease in salinity of sea water
 - C. increase in poisonous plankton
 - D. increases pollution of coastal waters
 - E. A and C is correct
16. All but which one of these factors is not involved in the preservation of jams?
- A. Water activity
 - B. Heat processing
 - C. Nitrates
 - D. pH
 - E. Sorbic acid
17. Reports of foodborne disease indicate that the implicated food was usually;
- A. a canned food
 - B. a food held for long periods at temperatures favorable to bacterial multiplication
 - 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
18. Which of the following is not consistent with present knowledge of bacterial survival in the frozen food?
- A. survival of part of the bacterial population is expected
 - 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. None of the above statements

19. 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. All of the above are correct
20. Rapid heat transfer in cooking, cooling and thawing is important because a food 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
21. 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
22. The recommended 60 deg C. holding temperature:
- A. Is a maximum temperature.
 - B. Should prevent bacterial multiplication
 - C. Is much higher than cooking temperatures
 - D. Can be depended on to kill contaminants
 - E. Will provide a sterile food temperature environment
23. The 12D process for low acid canned foods consists of:
- A. a process 12 times the D value for *Bacillus stearothermophilis*
 - B. a process 12 times the D value for *Clostridium botulinum*
 - C. boiling for 12 hours
 - D. heat processing at 120 deg C
 - E. heat processing for 12 minutes in a retort (121 deg C)

24. Some countries consistently report more foodborne outbreaks and more cases than others. The most likely explanation for this observation is that:
- A. The countries reporting high numbers of outbreaks have notoriously poor health departments
 - B. The environmental health officers “health inspectors” in these high reporting countries are lazy, inefficient, and poorly trained
 - C. These countries have higher rates because they encourage reporting and investigation of foodborne diseases.
 - D. The countries with higher rates have inferior sanitation practices in their food establishments.
 - E. These countries reporting higher rates are likely to be third world countries.
25. Factors that cause inhibition and death of microorganisms in carbonated beverages are;
- A. CO₂ and low pressure
 - B. CO₂ and pH
 - C. pH and water activity
 - D. reduced oxidation-reduction potential and water activity
 - E. water activity and sugar content

[25 Marks]

Question 2

- a. Fruits are preserved by placing them in a sugar syrup and certain meat products are preserved by placing them in salt brine. How does this work? [4]
- b. How do light, oxygen and long storage affect nutrients in foods? [9]
- c. 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]
- d. How does low temperature preserve foods? [8]

[25 Marks]

Question 3

- a. What is a commercially sterile product? [3]
- b. In Coca-Cola soft drinks, sodium benzoate is the preservative of choice. Why is that so? [2]
- c. How do the following factors influence heat resistance in microorganisms?
- Environmental factors [9]
 - Age of cells [3]
 - Types of microbes [3]
 - Number of cells [3]
 - Sodium chloride (NaCl) [3]

[25 Marks]

Question 4

- a. What good use does ultraviolet (UV) irradiation have in the food establishment and what shortcomings does this method have? [7]
- b. How does (UV) irradiation affects microorganisms in food? [5]
- c. State the reasons why, organic acids are used in food preservation, as oppose to inorganic acids. [5]
- d. Discuss the effects of pH on food spoilage and pathogenic microorganisms. [8]

[25 Marks]

Question 5

- a. Giving good examples, show how intrinsic factors assist in the preservation of foods. [5]
- b. Why is sodium nitrate added in food? [5]
- c. What is the main killing effect of bacteria in Coca Cola soft drinks? [2]
- d. Besides being used to control microbial growth, sulfur dioxide is added to a variety of foods, for what purpose. [4]
- e. In a mixed population of microorganisms in food, you add calcium sorbate salt. What is likely to happen? [6]
- f. Explain the main purpose of food additives in food. [3]

[25 Marks]