



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

**DIPLOMA IN ENVIRONMENTAL HEALTH**  
**FINAL EXAMINATION PAPER 2011**

**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. 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 a microorganism has a maximal temperature for growth at 40 °C, and a minimal temperature at 8 °C, and its optimal temperature at 30 °C, it is classified as a:
  - A. mesophile
  - B. psychrophile
  - C. psychrotroph
  - D. thermophile
  - E. thermoduric
  
4. 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
  
5. 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

6. 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. below 0 deg c or above 100 deg C
  
7. If beef prepared from the semi tropics climate, and 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
  
8. Spoilage of jam that is characterized by gas bubbles is probably caused by:
  - A. coliforms
  - B. yeasts
  - C. molds
  - D. micrococci
  - E. Clostridium perfringens
  
9. 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
  
10. Which of the following is not consistent with present knowledge of bacterial survival in the frozen food?
  - A. it 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

11. 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
12. 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
13. 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
14. The recommended 60 deg C. hot 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
15. 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.
16. Egg white spoilage would most likely have been caused by which of these group of microorganisms.
- A. gram-positive cocci
  - B. gram-positive rods
  - C. gram-negatives rods
  - D. molds
  - E. yeasts
17. Benzoic acid can not be relied on to preserve food that is capable of supporting bacterial growth because;
- A. Enterobacteriaceae are resistant to it
  - B. it is too toxic
  - C. many spoilage bacteria are quite resistant to it.
  - D. many spore-forming bacteria readily germinate in solutions of benzoate ions.
  - E. *Staphylococcus aureus* is resistant to it
18. Which one of the following attributes of growth of microorganisms is not affected by temperature?
- A. duration of the lag phase
  - B. enzymatic and chemical composition of the cells
  - C. initial cell numbers
  - D. nutritional requirements
  - E. metabolic pathways and end products
19. If antimicrobial activity of organic acids increases with chain length, why do acids of chain length greater of C<sub>10</sub> or C<sub>11</sub> have very little potential activity as food preservatives?
- A. They do not link with bacterial nucleic acids
  - B. They have high pH
  - C. They have low pH
  - D. They are highly toxic
  - E. They have low solubility in water
20. Blanching of vegetables has several useful applications in food processing, but does not:
- A. destroy spores of most bacteria
  - B. fix their color
  - C. inactivate enzymes
  - D. kill most molds and yeast
  - E. reduce bulk

21. Based on pH alone, which organic acid would you choose to preserve a food that a pH of 5?
- A. acetic acid
  - B. citric acid
  - C. lactic acid
  - D. propionic acid
  - E. sorbic acid
22. Ultra Violet (UV) light can damage certain foods, but it does not:
- A. cause butter to become rancid
  - B. cause oxidation of lipid in pork
  - C. cause oxidation of milk and the development of off flavors
  - D. caused sugar to become lumpy
  - E. produce discolored spots on leaves of green vegetables
23. 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
24. Which of the following microorganisms are more sensitive to ionizing radiation?
- A. bacterial spores
  - B. gram-positive cocci
  - C. gram-positives rods
  - D. gram-negative rods
  - E. yeasts
25. Avidin and lysozyme are intrinsic antimicrobial substances that are found in:
- A. garlic
  - B. tomatoes
  - C. yogurt
  - D. onions
  - E. eggs

**[25 Marks]**

## Question 2

- a. 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?[5]
- b. Demonstrate your understanding of the effects of the following preservatives on the survival and growth of microorganisms in foods.
- i. Organic acids [12]
  - ii. Ultraviolet radiation [8]

[25 marks]

## Question 3

- a. How do nitrites and smoking prolong the shelf life of meat products? [10]
- b. Identify the control measures and preventative practices for the protection of raw milk. [15]

[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. In the canning process of beef, explain the risk factors to contamination that are likely to result in foodborne illness. [15]

[25 marks]

## Question 5

- a. Giving good examples show how intrinsic factors are important in the preservation of foods. [6]
- b. Show the relationship between time and temperature as related to the survival and growth of bacterial in foods. [8]
- c. Besides being used to control microbial growth, sulfur dioxide is added to a variety of foods, for what purpose. [5]
- d. In a mixed population of microorganisms in food, you add calcium sorbate salt. What is likely to happen? [6]

[25 marks]