



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

**DEGREE IN ENVIRONMENTAL HEALTH**  
**FINAL EXAMINATION PAPER 2018**

**TITLE OF PAPER** : FOOD PRESERVATION

**COURSE CODE** : EHS 348

**DURATION** : 2 HOURS

**MARKS** : 100

**INSTRUCTIONS** :

- : ANSWER ONLY FOUR QUESTIONS
- : QUESTION ONE IS COMPULSORY
- : EACH QUESTION CARRIES 25 MARKS.
- : READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
- : NO PAPER SHOULD BE BROUGHT INTO THE EXAMINATION ROOM.
- : 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 stored in cold temperature, which group of spoilage organisms is susceptible to injury at temperatures below 3.3deg C?
  - A. gram positive cocci
  - B. gram negative rods
  - C. gram positive rods
  - D. bacterial spores
  - E. psychrophiles
  
2. 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. to delay the multiplication of microorganisms
  
3. Which form of sulfur dioxide is more active against microorganisms?
  - A. bisulfate ions
  - B. sulfite ions
  - C. undissociated sulfur dioxide
  - D. any undissociated form
  - E. all forms are equally effective
  
4. Which type of microorganism is most resistant to UV irradiation?
  - A. bacterial spores
  - B. gram-positive cocci in chains
  - C. gram-positive cocci in clusters
  - D. gram-negative non-sporing rods
  - E. mold spores
  
5. Treatments such as drying or freezing affect bacteria in foods in which of the following ways?
  - A. kill all of them
  - B. have no effect on their viability
  - C. kill and injure some of them
  - D. resuscitate them
  - E. make them more resistant to chemicals

6. Benzoic acid cannot be relied on to preserve foods capable of supporting bacterial growth because?
- A. It can inhibit most yeast and molds
  - B. It is an antimycotic agent
  - C. Many spoilage bacteria are much more resistant to it
  - D. Food poisoning and spore-forming bacteria are generally inhibited by 0.01-0.02 % undissociated acid
  - E. Both A and B
7. 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. cause sugar to become lumpy
  - E. produce discoloration spots on leaves of green vegetables
8. Which part of a microbial cell is the most susceptible to decomposition by UV irradiation?
- A. amino acids
  - B. lipids
  - C. nucleic acids
  - D. the cell wall
  - E. water molecules
9. UV irradiation is most useful for killing microbes;
- A. in aerosols
  - B. in air or surfaces
  - C. in milk
  - D. in untreated water
  - E. on surfaces of wet or greasy foods
10. Bakeries have found UV helpful in controlling microorganisms;
- A. in interiors of cream-filled pies
  - B. in flour that is stained by rodent urine
  - C. in air to prevent spread of viable microorganisms to surface of bread
  - D. in jam and jelly fillings
  - E. in dough to accelerate fermentation
11. Curing salts are;
- A. ascorbic acid and nitrous oxide
  - B. sodium or calcium chloride and potassium permanganate
  - C. sodium chloride and sodium or potassium nitrite or nitrate
  - D. sodium and potassium nitrite or nitrate
  - E. sodium or potassium chloride and sodium nitrite

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. Factors inherent in a food that can influence microbial growth are known as:
- A. extrinsic factors
  - B. intrinsic factors
  - C. nutritional factors
  - D. physicochemical factors
  - E. processing factors
14. The direct or indirect transmission of objectionable matter to a food product is called by which of these names?
- A. adulteration
  - B. contamination
  - C. infection
  - D. infestation
  - E. pollution
15. Which of these microorganisms are sensitive to freezing temperatures?
- A. *Clostridium botulinum* type E
  - B. Spores and toxins
  - C. *Clostridium perfringens* and *Bacillus subtilis*
  - D. *Listeria monocytogenes* and *Yersinia enterocolitica*
  - E. *Cladosporium herbarum*
16. Which of the following statements is **not correct** in relation to freezing temperatures?
- A. *Pseudomonas*, and *Alcaligenes* species will grow
  - B. *Penicillium* and *Thamnidium* species grow in frozen meat
  - C. Parasitic protozoa and *Cystereicus bovis* are destroyed
  - D. Rod shaped bacteria are more resistant than cocci shaped bacteria
  - E. The growth of psychrophiles in meat results in color defects.
17. Bacterial contaminants;
- A. Multiply rapidly in dehydrated foods
  - B. Resume multiplication when dried foods are reconstituted.
  - C. Do not grow well in reconstituted dehydrated foods.
  - D. Are eliminated in foods during the dehydration process.
  - E. Are not found in dehydrated foods

18. 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 *Clostridium botulinum* cells
  - D. destroy all viable spores in the sausage except *Clostridium botulinum*
  - E. inactivate neurotoxins in the sausage
19. 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
20. If beef is prepared from the semi tropics climate (warm), 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. Will depend on the phase of the bacteria
21. Blanching of vegetables has several useful applications in food processing, but does not:
- A. destroy spores of most bacteria
  - B. fix color
  - C. inactivate enzymes
  - D. kill most molds and yeast
  - E. reduce bulkiness
22. Which of these foods has the lowest water activity ( $A_w$ )
- A. Chocolate
  - B. Breakfast cereals
  - C. Raisins
  - D. Flour
  - E. Sweetened condensed milk
23. 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. food that has been handled by a sick food handler

24. Which of the following is not consistent with present knowledge of bacterial survival in frozen food?
- it is possible for food poisoning to occur from ingestion of a frozen product containing Staphylococcal toxins
  - pathogenic bacteria may survive freezing, but freezing destroys their ability to multiply
  - survival is affected by the speed and temperature of freezing
  - some multiplication of bacteria may occur in bulky batches during the freezing process.
  - in minced beef, salmonellae survived the freezing storage
25. Reduction of water content in liquid foods without conversion to a dry state is known as:
- concentration
  - condensation
  - evaporation
  - extraction
  - sublimation

[25 Marks]

**Question 2**

- Write short notes on food preservation by the use of;
  - Ultraviolet(UV) irradiation [8]
  - Gamma rays [8]
- How do the following factors influence the effectiveness of a chemical preservative in food?
  - Type of microbes [2]
  - Age of microbes [2]
  - State of the microbe [2]
- Benzoic acid is added in food to combat acid tolerant fungi. Name two yeasts that may grow in soft drinks in the presence of benzoic acid. [3]

[25 Marks]

**Question 3**

- Using appropriate examples, explain why antioxidants are added in foods. [3]
- In what type of food would you add sodium nitrate and why? [5]
- Show the relationship between pKa and the preservation of foods by organic acids.[5]
- Explain the health risk in the process of canning vegetables for the following processes.
  - Exhaustion [3]
  - Sterilization [6]
  - Cooling [3]

[25 Marks]

**Question 4**

a) Select **any three** organic acids of your choice and then discuss each under the following topics.

- antimicrobial activity [3]
- limitation [2]
- types of food added [2]

b) How does wood smoke preserve food?

[4]  
[25 marks]

**Question 5**

a) Discuss the effects of low and freezing temperature on microorganisms. [10]

b) How can you reduce or prevent the spoilage of food in the freezer? [5]

c) In which foods is Sulfur dioxide added and why? [5]

d) Using appropriate examples explain the activity of microorganisms in different water activity. [5]

[25 Marks]