



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

**DEGREE IN ENVIRONMENTAL HEALTH**  
**FINAL EXAMINATION PAPER 2019**

**TITLE OF PAPER** : FOOD PRESERVATION

**COURSE CODE** : EHS 447

**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 hot holding temperature, which group of spoilage organisms is likely to survive in temperatures above 60deg C?
  - A. gram positive cocci
  - B. gram negative rods
  - C. gram positive rods
  - D. mold spores
  - E. mesophilic bacteria
  
2. 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
  
3. Benzoic acid cannot be relied on to preserve foods capable of supporting bacterial growth because?
  - A. It cannot 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 % of the undissociated acid
  - E. It is ineffective against catalase-negative bacteria
  
4. Which statement is not true in relation to the Sorbic acid?
  - A. it has wide spectrum of activity against catalase –positive microbes
  - B. its used to inhibit aerobic contaminants in fermented or acidulated foods
  - C. its ineffective against catalase-negative bacteria
  - D. its effective inhibitor against molds, yeasts and bacteria at neutral pH
  - E. it can be used as selective agent in media for the isolation of clostridia.
  
5. 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

6. The direct or indirect transmission of objectionable matter to a food product is called by which of these names?
- A. adulteration
  - B. contamination
  - C. food infection
  - D. pollution
  - E. food poisoning
7. Alternate partial thawing and refreezing of foods under 5deg 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. Freezing delay the multiplication of microorganisms
8. A major disadvantage of ionizing irradiation of foods is that:
- A. foods cannot be irradiated in the frozen state.
  - B. considerable heat is produced.
  - C. Most 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
9. Which of the following microorganisms are more sensitive to ionizing radiation?
- A. bacterial spores
  - B. gram- positive cocci
  - C. gram -positive rods
  - D. gram-negative bacteria
  - E. yeasts
10. Sensitivity to irradiation is highest in:
- A. aerobic atmosphere
  - B. anaerobic atmosphere
  - C. dry foods
  - D. cooked foods
  - E. frozen foods
11. Sulfur dioxide is added to foods for all but which one of these reasons?
- A. to control microorganisms
  - B. as an antioxidant
  - C. to reduce enzymatic browning
  - D. to prevent loss of thiamine
  - E. to reduce non-enzymatic browning

12. Which of these foods has the lowest  $a_w$ ?
- A. cereals
  - B. chocolate
  - C. strawberry jam
  - D. cheddar cheese
  - E. bread
13. Which classes of microorganisms are likely to cause spoilage in foods kept at temperature between (2 to -5deg C)
- A. Psychrophilic microbes
  - B. Mesophilic microbes
  - C. Gram-positive bacteria
  - D. Gram-negative bacteria
  - E. Both A and C
14. 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 poisonous 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
15. While the optimum storage temperature for frozen foods is -18deg C, temperature may rise above that level, for example, at -2deg C, we expect;
- A. slow spoilage without danger to health
  - B. a complete die off of pathogenic microbes
  - C. some growth of pathogens
  - D. no psychrophilic growth
  - E. B and C are correct
16. Although microbial growth does not occur in frozen foods held below -10deg C;
- A. the food will have a long shelf life without being spoiled
  - B. many enzymes will remain active and spoil the food
  - C. some gram-negative bacteria such *Escherichia coli* are likely to survive
  - D. freezing is a best safeguard against the transmission of food borne illness.
  - E. toxins of *Clostridium botulinum* are inactivated too.
17. The temperature range considered safe for holding potentially hazardous foods is;
- A. below 5deg C or above 55deg C
  - B. below 8deg C or above 60deg C
  - C. below 10deg C or above 55deg C
  - D. below 5deg C or above 60deg C
  - E. below 0deg c or above 100deg C

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. 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 some of them
  - E. make them more resistant to chemicals
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 13.5deg C
  - C. thawing in a pan of water at room temperature
  - D. thawing under refrigeration
  - E. thawing under microwave oven
21. The recommended 60deg 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
22. The 12D process for low acid canned foods consists of:
- A. a process 12 times the D value for *Bacillus stearothermophilus*
  - B. a process 12 times the D value for *Clostridium botulinum*
  - C. boiling for 12 hours
  - D. heat processing at 120deg C
  - E. heat processing for 12 minutes in a retort (121deg C)

23. Which statement is not correct in relation to pH effects on food spoilage?
- A. the bacteria responsible for the spoilage of acidic foods are all gram-positive
  - B. lactobacilli will grow in the presence of lactic or acetic in food
  - C. the growth of *Lactobacillus acidophilus* will inhibit or destroy *Salmonella typhimurium* and *S. enteritidis* in food.
  - D. the resistance of vegetative cells to heat is not affected either by acidic or alkaline media.
  - E. Egg white has lysozyme which is active at alkaline pH
24. Sulfur dioxide is added in wine to prevent;
- A. mold growth
  - B. bacterial growth
  - C. yeasts growth
  - D. rancidity
  - E. enzymatic and non-enzymatic browning
25. Egg white spoilage would most likely have been caused by which of these classes of organisms
- A. gram-positive cocci
  - B. gram-positive rods
  - C. gram-negative rods
  - D. ascaris worms
  - E. *Salmonella enteritidis*

[25 Marks]

**Question 2**

- a. In the canning process of beef, explain three (3) common risk factors that may result in foodborne illness. [10]
- b. In what type of food would you add sodium nitrate and why? [5]
- c. Explain the likely risk posed by the use of nitrate in food. [5]
- d. How do microwave ovens reheat foods? [5]

[25 Marks]

**Question 3**

- a. Show the negative effects on the use of gamma rays and ultra-violet (UV) rays in food preservation. [12]
- b. Using appropriate examples, explain the general effects of low temperature to microorganisms. [10]
- c. Show the negative effects of freezing temperature on the food. [3]

[25 Marks]

**Question 4**

- a. Excluding microbial spoilage, what are the factors that may cause food to deteriorate or spoil during storage? [8]
  - b. Show the relationship between pKa and the preservation of foods by organic acids. [5]
  - c. Besides being used to control microbial growth, sulfur dioxide is added to a variety of foods, for what purpose. [4]
  - d. Meat is stored at temperatures below 0deg C but after one month, the meat is spoiled. Explain the reason for the spoilage. [5]
  - e. Sulfur dioxide is used to inhibit gram negative bacteria, molds and yeast in soft drinks and other foods. What problems are associated with the use of Sulfur dioxide in food? [3]
- [25 Marks]**

**Question 5**

- a. Compare the benefits of freeze-drying over those of dehydration of food. [5]
  - b. Discuss the effects of dehydration on microorganisms in food preservation. [10]
  - c. What is the difference between pasteurized and sterilized foods? [5]
  - d. Show the effects on microorganisms when heated in an acid or neutral pH or reduced water activity medium. [5]
- [25 Marks]**