



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF SCIENCE
AND TECHNOLOGY (MMUST)**

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR
(Main Examinations)**

**FOURTH YEAR SECOND SEMESTER EXAMINATIONS
FOR THE DEGREE OF**

BACHELOR OF SCIENCE IN FOOD PROCESSING TECHNOLOGY

COURSE CODE: AFS 201

COURSE TITLE: FOOD MICROBIOLOGY

DATE: 20TH APRIL 2022

TIME: 12.00-2.00PM

Instruction to candidates

- I. ANSWER ALL QUESTIONS IN SECTION A AND B, THEN ANY TWO QUESTIONS IN SECTION C.**

MMUST observes ZERO tolerance to examination cheating

This paper consists of THREE printed pages. Please Turn Over

SECTION A: ANSWER ALL QUESTIONS (20 Marks)

1. Which of the following is not a key factor to consider in food microbiology:
 - a) Prevent Food Spoilage
 - b) Prevent Food-borne Illnesses
 - c) To consider all microorganisms unwanted in foods
 - d) Food Preservation and Production

2. Which of the following **Sour or Acid Flavor** does not match with the causative microorganism in milk
 - a) "clean," - *Streptococcus lactis*
 - b) "aromatic;" *Leuconostoc* spp
 - c) 'Fruity' - *P. fragi*
 - d) "sharp," - *Clostridium* spp

3. How do microorganisms cause food spoilage?
 - a) By increasing their numbers, Utilizing nutrients , Producing enzymatic changes and Contributing off flavours by means of breakdown of a product or synthesis of new compounds, they can spoil the food.
 - b) By changing the food substances into products with different flavours for consumption
 - c) By causing diseases in human beings trough invasiveness and toxigenicity after ingestion
 - d) All the above

4. Food microbiologists can use microorganisms against other microorganisms for preservation by
 - a) Using microorganisms to engulf others in foods
 - b) Selectively choosing Probiotic bacteria, including those that produce bacteriocins, which can kill and inhibit pathogens.
 - c) Increasing in numbers to consume all the nutrients then die because of the shortage
 - d) None of the above

5. Which of the following is not an intrinsic parameter in microbial growth
 - a) pH
 - b) Presence and concentration of gas
 - c) Antimicrobial constituents
 - d) Biological structures

6. From the listed microorganisms, which one is odd
 - a) Aerobic
 - b) Anaerobic
 - c) Mesophillic

d) Facultative

7. What are buffers in foods?

- a) Are substance that reduce the pH of a food to cause preservation
- b) The compounds that resist changes in pH and have ability to be especially effective within a certain pH range.
- c) Are substances added in all foods to keep microorganisms out of the food and increase its nutritional value
- d) Are substances which some foods develop from the accumulation of acid during fermentation.

8. The following characteristics important in food bacteriology when assessing cultural characteristics of Bacterial growth. Which one is not

- a) Pigmented bacteria cause discolorations on the surfaces of foods
- b) Development of acidity in foods
- c) Growth may make surfaces slimy
- d) Growth throughout the liquids may result in undesirable cloudiness or sediment.

9. Which of the following genera of microorganisms does not belong to the group of lactics

- a) *Lactobacillus*
- b) *Leuconostoc*
- c) *Streptococcus*
- d) *Mycobacterium*

10. The following are fungi of importance in food microbiology. Which one is not?

- a) *Pseudomonas* A number of species of *Pseudomonas* can cause food spoilage. These are gram-negative, usually motile, asporogenous rods
- b) *Penicillium*: - Cause soft rot of fruits. Aid in the ripening of blue cheeses, e.g., *Roquefort*.
- c) *Aspergillus*: - Many are involved in the spoilage of foods, and some are useful in the preparation of certain foods. The molds grow well in high concentrations of sugar and salt and hence in many foods of low moisture content.
- d) *Genus Saccharomyces*;- The leading species, *S. cerevisiae*, is employed in many food industries, with special strains used for the leavening of bread, as top yeasts for ale, for wines, and for the production of alcohol, glycerol, and invertase.

11. The following is true about bottom yeast

- a) are very active fermenters and grow rapidly at 20°C. The clumping of the cells and the rapid evolution of CO₂ sweep the cells to the surface

- b) do not clump, grow more slowly, and are best fermenters at lower temperatures (10 to 15°C). The absence of clumping and the slower growth and evolution of CO₂ permit the yeast to grow
- c) any yeast other than the one being used or encouraged. Thus yeast employed in one process could be a wild/ false yeast
- d) None of the above

12. Which of the following is a Systemic infection –

- a) Invasiveness
- b) Toxemia
- c) Endotoxin
- d) Focal

13. Which of the following is the odd one out in terms of microbial toxigenicity

- a) Staphylococcus
- b) *Aspergillus flavus*
- c) Salmonella
- d) Clostridium botulinum

14. How is the information obtained from the microbial growth curve used in Food Preservation technics

- a) By introducing as few spoilage organisms as possible, i.e., by reducing the amount of contamination; the fewer organisms present, the longer the lag phase.
- b) By avoiding the addition of actively growing organisms (from the logarithmic phase of growth). Such organisms might be growing on unclean containers, equipment, or utensils that come in contact with foods.
- c) By one or more favourable environmental conditions: favourable food, moisture, temperature, pH, or O-R potential, or presence of inhibitors. The more favourable the conditions, the longer the delay of the initiation of growth.
- d) By actual damage to organisms by processing methods such as heating or irradiation

15. You are working in a food processing plant and one of the rules reads, ‘ ensure asepsis in all that you do’ What does this entail?

- a) Making sure that all the spoilage and pathogenic microorganisms are eliminated to prevent food spoilage and foodborne diseases
- b) It is keeping out microorganisms by observing kitchen, personal, food and environmental hygiene
- c) Ensuring that all the microorganisms in foods are killed by heating, low temperature storage or irradiation before serving or packaging

- d) Removing all the microorganisms by cutting, trimming, washing, filtration and centrifuging foods
16. The following are modes of action of chemicals on microorganisms in foods
- Interference with the cell membrane functions
 - Physically killing the microorganisms to make the foods sterile
 - Deactivation of essential enzymes in microorganisms
 - Interference with protein or nucleic acid formation
17. The following are effects of salt on microorganisms. Which one is not
- It dehydrates foods by drawing out and typing up moisture as it dehydrates microbial cells.
 - It ionizes to yield the chlorine ion.
 - It reduces the insolubility of oxygen in the moisture
 - It interferes with the action of proteolytic enzymes.
18. Identify the description that illustrates a thermal microbial destruction methods
- These are chemical substances produced synthetically (chemically) or biologically for the purpose of treating disease.
 - These are chemicals produced by the metabolism of certain microorganisms and are detrimental to the growth or survival of other microorganisms.
 - This technique is applied to foods, which can be liquid or solid, packaged or unpackaged, to high pressure (which varies depending upon application) usually for 5 minutes or less.
 - The energy or heat produced by microwaves as they pass through a food is a result of the extremely rapid oscillation of the food molecules to align themselves with the electromagnetic field being produced.
19. Which of the following is as a result of Spoilage under aerobic conditions
- Souring
 - Surface slime
 - Putrefaction
 - Taint
20. Which of the following is not a method used to prevent moldiness of bread:
- Baking the bread in oven set at high temperatures
 - Filtration and washing of air to the room and irradiation or the room and more especially the air by means of U.V. rays cut down contamination.
 - Prompt and adequate cooling of the loaves before wrapping to reduce condensation of moisture beneath the wrapper.
 - Incorporation of mycostatic chemicals material in the bread dough.

SECTION B – 30 MARKS (Answer all Questions)

21. a) Define the following terms as used in Food Microbiology

- i. Microbiological criteria of foods
 - ii. Mycotoxins
 - iii. Food Infection
 - iv. Indicator microorganisms
- (4 marks)**

b) Differentiate between the following terms

- i. Endotoxin and exotoxin
 - ii. Food spoilage and food poisoning
- (4 marks)**

22. a) Match the following antimicrobial/inhibitory substances on your left with the food source on your right

Lectins	Egg white
Eugenol	Green beans
Oleuropein	Onions
Phaseolin	Olives
Allicin	Fresh milk
Lysozyme	Cloves

(3marks)

23. (a) Describe the four (4) types of spoilage in meat caused by bacteria under aerobic conditions of storage. **(4 marks)**

b) Explain the (2) ways in which microorganisms are useful in the food industry **(3 marks)**

c) Describe the Biological spoilage of canned foods under the following

- i) Flat Sour Spoilage
 - ii) Sulfide, or "Sulfur Stinker," Spoilage
 - iii) TA Spoilage (Thermophilic anaerobe)
- (6 marks)**

24. Describe the three types of microbiological criteria of foods **(6 marks)**

SECTION C – 20 MARKS (Answer any two Questions)

25. a) Describe the hurdle concept and explain its importance in Food Microbiology.

(b mark)

- b) Discuss any three (3) intrinsic, three (3) extrinsic and three (3) implicit parameters that affect microbial growth in food. **(9 marks)**
- (c) With the aid of a diagram, discuss the growth curve for microbial cultures in food showing the important phases of growth. **(10 marks)**
- (d) Discuss food poisoning caused by the following bacteria with reference to frequency of occurrence, symptoms, prevention and control measures.
- (i) *Salmonella typhimurium*
 - (ii) *Staphylococcus aureus*
 - (iii) *Clostridium botulinum* **(10 marks)**
- (e) Discuss the microbiology of milk from the farm to when yoghurt is packaged **(10 marks)**
- (f) Sampling is mandatory in microbiological analysis of food. Discuss the various techniques used to sample liquid foods, solid foods and surfaces in the food industry **(10 marks)**

