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| QUALIFICATION: **BACHALOR OF ENVIRONMENTAL HEALTH SCIENCES** | |
| QUALIFICATION CODE: **08BOH** | LEVEL: **5** |
| COURSE: **MICROBIOLOGY AND PARASITOLOGY** | COURSE CODE: **MAP 512S** |
| DATE: **NOVEMBER 2024** | SESSION: **1** |
| DURATION: **3 HOURS** | MARKS: **100** |

**FIRST OPPORTUNITY: EXAMINATION QUESTION PAPER**

**EXAMINER:** **DR. RENATUS PETER SHILANGALE**

**MODERATOR:** **DR. LARAI AKU-AKAI**

**INSTRUCTIONS**

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

**PERMISSIBLE MATERIALS**

1. None

**ATTACHEMENTS**

1. None

**This paper consists of 7 pages including this front page**

## SECTION A: MATCHING, MULTIPLE CHOICE AND TRUE / FALSE [30 MARKS]

### QUESTION 1: MATCHING QUESTIONS [10 MARKS]

Evaluate the statements in each numbered section and select the most appropriate answer or phrase from the given possibilities. Fill in the appropriate letter from the table below next to the number of the correct statement/phrase on your ANSWER SHEET.

| | | | |
|---|---|---|---|
| 1.1 | Lives and reproduces only in the absence of oxygen | [1] | |
| 1.2 | Lives in the presence of oxygen and without oxygen (can live in both environments) | [1] | |
| 1.3 | A process of using microorganisms to reduce pollution through the biological degradation of pollutants into non-toxic substances. | [1] | |
| 1.4 | Heat treatment that kills endospores of *Clostridium botulinum* the causative agent of botulism, in canned food. | [1] | |
| 1.5 | Parasite that are capable of living either free or in or on hosts | [1] | |
| 1.6 | Complete destruction or removing all forms of microbial life (including endospores) in a material or an object. | [1] | |
| 1.7 | Those bacteria that are capable of causing illness in persons consuming the food. | [1] | |
| 1.8 | The process of treating and handling food to stop or slow down spoilage and thus prolonging the shelf life of food. | [1] | |
| 1.9 | An agent that inhibits the growth of bacteria, but does not necessarily kill them. | [1] | |
| 1.10 | An organism in which the adult or final stage of a parasite develops. | [1] | |

| | | | |
|---|---|---|---|
| A | Commercial Sterilization | H | Asepsis |
| B | Facultative parasites | I | Bacteriostatic Agent |
| C | Food contamination | J | Obligate parasites |
| D | Sterilization | K | Foodborne pathogens |
| E | Bioremediation | L | Facultative anaerobes |
| F | Definitive host | M | Food preservation |
| G | Anaerobic | N | Aseptic techniques |

**QUESTION 2: TRUE/FALSE QUESTIONS** **[10 MARKS]**

Evaluate the statements and select whether the statement is true or false. Write the word 'True' or 'False' next to the corresponding number on your ANSWER SHEET.

| | | |
|---|---|---|
| 2.1 | A single cell microorganism can reproduce without interaction with other organism by a process known as budding. [1] | |
| 2.2 | Chemotherapeutic agents used to treat infectious disease can be synthetic drug or antibiotic. [1] | |
| 2.3 | 'Parasites' are organisms that derive nourishment and protection from other living organisms known as 'hosts'. [1] | |
| 2.4 | Archaea are microorganisms that often survive or found in extreme environments (extremophiles). [1] | |
| 2.5 | Lactic acid bacteria (*Lactobacillus* spp.) is a group of bacteria that metabolize lactose (a form of sugar) in milk products to alcohol and carbon dioxide. [1] | |
| 2.6 | Robert Koch discovered the first antibiotic known as Penicillin which belongs to the *Penicillium* genus by accident. [1] | |
| 2.7 | Vectors are transmitters of food borne diseases by a process known as cross contamination. [1] | |
| 2.8 | Zoonotic Diseases is an infectious disease that is transmitted between species from animals to humans (or from humans to animals). [1] | |
| 2.9 | The germ theory of disease suggested that it was the unclean, unhealthy air that was causing disease. [1] | |
| 2.10 | *Saccharomyces cerevisiae* is a specie of yeast that is also called baker's yeast. [1] | |

**QUESTION 3 MULTIPLE CHOICE QUESTIONS** **[10 MARKS]**

Evaluate the statements in each numbered section and select the most appropriate answer or phrase from the given possibilities. Write only the appropriate letter next to the question in the ANSWER SHEET provided.

**3.1. Which of the following individuals is credited for definitively refuting the theory of spontaneous generation using broth in swan-neck flask?** **[1]**

(A) Aristotle

(B) Jan Baptista van Helmont

(C) John Needham

(D) Louis Pasteur

(E) None of the above

**3.2 Bacteria isolated from Lake Natron, where the water pH is close to 10, are which of the following?** **[1]**

(A) Alkaliphiles

(B) Facultative anaerobes

(C) Neutrophiles

(D) Obligate anaerobes

(E) Anaerobic bacteria

**3.3. Which of the following is the reason jams and dried meats often do not require refrigeration to prevent spoilage?** **[1]**

(A) Low pH

(B) Toxic alkaline chemicals

(C) Naturally occurring antibiotics

(D) Low water activity

(E) None of the above

**3.4. Salt and sugar preserve foods because they:** **[1]**

(A) Make environment too sour and sweet at the same time

(B) Produce a hypotonic environment

(C) Deplete all the nutrients

(D) Produce a hypertonic environment

(E) Make them acid.

**3.5. Which of the following terms refers to a bacterial cell that is rod shaped?** **[1]**

(A) Cocci

(B) Comma forms

(C) Bacilli

(D) Plermophic forms

(E) Spirochaetes

**3.6. Physical methods are usually used to control the growth of microorganisms. Which of the following physical method should NOT be relied upon for sterilization?** **[1]**

(A) Ionizing radiation

(B) Dry heat

(C) Autoclave

(D) Pasteurization

(E) All of the above

**3.7 Bacteria living in salt marshes are most likely to be which of the following?** **[1]**

(A) Acidophiles

(B) Barophiles

(C) Halotolerant

(D) Thermophiles

(E) Psychrophiles

**3.8. The word Decontamination means:** **[1]**

(A) Removing toxins

(B) Sterilization

(C) Cleaning with water

(D) Killing microorganisms

(E) Bactericide.

**3.9. An example of a malaria parasite specie is?** **[1]**

(A) Entamoeba histolytica

(B) Giardia lamblia

(C) Plasmodium falciparum

(D) Amoebae

(E) None of the above

**3.10 One of the following below is not a typical Phenotypic Classification method for classification of microorganisms:** **[1]**

(A) Morphological

(B) DNA hybridazation

(C) Biochemical factors

(D) Antigenic factors (Serological)

(E) Staining

## SECTION B: SHORT/LONG ANSWER QUESTIONS [70 MARKS]

Please answer ALL of the questions in this section.

**QUESTION 4** **[10 MARKS]**

4.1. What are the four (4) Koch's postulates? [4]

4.2. There are activities (characteristics) which make organisms (living organisms) different from non-living things. Explain ANY three (3) characteristics of living organisms. [6]

**QUESTION 5** **10 MARKS]**

5.1. Outline the Basic Principles of Food Preservation. [4]

5.2. To control microbial growth, one would apply different physical methods depending on the product or material in question. Briefly discuss ANY three (3) "Heat methods" that can be used to control microbial growth. [6]

**QUESTION 6** **[10 MARKS]**

6.1. What is the difference between Ectoparasites and Endoparasites? [4]

6.2. Briefly explain three (3) major causes/types of food spoilage. [6]

**QUESTION 7** **[10 MARKS]**

7.1. Explain the two (2) main factors that affect microbial growth in foods. [4]

7.2. Food-borne illness caused by microorganisms is generally classified into different categories. Briefely, explain the three (3) different categories of foodborne illness. [6]

**QESTION 8** **[10 MARKS]**

8.1. What is the definition of fermentation? [2]

8.2. What are probiotics? [2]

8.3. Explain the three (3) benefits of fermentation in food. [6]

**QUESTION 9** **[10 MARKS]**

9.1. Explain the two (2) categories Life cycles of parasites. [4]

9.2. Briefly, explain three (3) different types of symbiosis? [6]

**QUESTION 10** **[10 MARKS]**

10. You are asked by Head of Department to explain to some students about food contamination by microorganisms. Write a plan of what you will tell them, including explaining why microorganisms are dangerous and under what conditions they grow and multiply. [10]

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**END OF QUESTION PAPER**