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| QUALIFICATION :  BACHELOR OF SCIENCES HONOURS | |
|---|---|
| QUALIFICATION CODE: **08BOSH** | LEVEL: **8** |
| COURSE: **ADVANCED MICROBIOLOGY** | COURSE CODE: **AMB821S** |
| DATE:  **JANUARY 2024** | SESSION: **1** |
| DURATION:  **3 HOURS** | MARKS: **100** |

### SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATIONS: QUESTION PAPER

| | |
|---|---|
| EXAMINER: | *Dr Munyaradzi Zivuku* |
| MODERATOR: | *Prof Jane Misihairabgwi* |

### INSTRUCTIONS

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

### PERMISSIBLE MATERIALS

1. Non-Programmable Calculator

**This paper consists of 4 pages including this front page**

**QUESTION 1 (20)**

1.1 In 1872, Frans Schrandinger proposed that E.coli could be used to indicate that water is contaminated with feces. Briefly outline the main reason why E. coli was chosen as a test microorganism for the presence of contaminants in feces. (5)

1.2 Propose a method that could be used for the isolation and enumeration of coliforms from contaminated water. (5)

1.3 Write short notes on the preservation and maintenance of microorganisms (10)

**QUESTION 2 (20)**

2.1 Jane is fourth year B.Sc. Honours student and she did an experiment to analyse the microbial load of water samples using the Most Probable Number (MPN) method in her laboratory. Jane used the MPN table (illustrated in table 1) and got an MPN of 9.2 per 100 ml.

Table1: Table of the most Probable Number (MPN) per 100ml of sampling using three tubes of each dilution

| Number of positive tubes in dilutions | | | |
|---|---|---|---|
| 10 ml | 1 ml | 0.1 ml | MPN per 100 ml |
| 0 | 0 | 0 | |
| 0 | 1 | 0 | 3 |
| 0 | 0 | 3 | 6 |
| 0 | 1 | 0 | 3 |
| 0 | 1 | 1 | 6.1 |
| 0 | 1 | 2 | 9.2 |
| 0 | 1 | 3 | 12 |

Briefly describe the principle and procedure of MPN that she used to arrive at an MPN of 9.2 per 100 ml. (8)

2.2 What is the disadvantages of MPN method as a diagnostic tool in microbiological samples. (3)

2.3 Outline the principle of protein evolution in industrial microbiology. (9)

## SECTION B (60 MARKS)

### QUESTION 3 (20)

3.1 Differentiate between transcriptomes and proteomes. (4)

3.2 Explain the importance of measurements of gene expression. (6)

3.3 Discuss how infectious diseases such Ebola virus can be prevented and Controlled. (10)

### QUESTION 4 (20)

4.1 Briefly describe three factors for the control and optimization of a bioremediation process. (6)

4.2 For a chosen bioremediation, describe how pollution gets into the environment. (3)
Answer

4.3 With the aid of an annotated diagram, discuss the role of antigen presenting cell in cell mediated immunity following the entering of infectious agent in the human body and its eventual removal from the body. (10)

**QUESTION 5 (20)**

5.1    Briefly explain the conditions necessary for a pathogen to cause disease.            (5)

5.2    The occurrence of plasmids in microorganism is a necessary evil. Discuss the
       statement.                                                                            (5)

5.3    Outline the pathogenic properties of viruses.                                         (5)

5.4    Give an account of the application of amylases enzymes in the food industry.          (5)

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**END OF THE QUESTION PAPER**