

2528/203
2922/203
ENVIRONMENTAL MICROBIOLOGY
Oct./Nov. 2016
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY

MODULE II

ENVIRONMENTAL MICROBIOLOGY

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
answer booklet;

a non-programmable Scientific Calculator.

This paper consists of TWO sections: A and B.

Answer ALL the questions in section A and any THREE questions from section B in the answer booklet provided.

Each question in section A carries 4 marks while each question in section B carries 20 marks.

Maximum marks for each part of a question are as shown.

Candidates should answer the questions in English.

This paper consists of 3 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A (40 marks)

Answer ALL questions in this section.

1. List **four** major groups of microorganisms. (4 marks)
2. State **four** challenges faced by a bacteria if it's capsule is removed. (4 marks)
3. Draw the structure of the following bacteria based on their flagella arrangement:
 - (a) monotrichous; (1 mark)
 - (b) lophotrichous; (1 mark)
 - (c) amphitrichous; (1 mark)
 - (d) peritrichous. (1 mark)
4. Differentiate between basic dyes and acid dyes used in staining microorganisms. (4 marks)
5. State **four** reasons that make it inappropriate to use open sewage for disposal of waste. (4 marks)
6. Outline the procedure for a wet preparation of sewage water used to observe motile bacteria. (4 marks)
7. State **four** sources of water pollution. (4 marks)
8. An unknown micro-organism was discovered in a seabed. State **four** reasons why a laboratory technician should stain the microorganism. (4 marks)
9. State **four** classes of bacteria based on oxygen requirement. (4 marks)
10. State **four** advantages of using phase-contrast microscope rather than bright-field microscope in observing bacteria. (4 marks)

SECTION B (60 marks)

Answer any THREE questions from this section.

11. (a) Describe five classes of bacteria based on their shape. (10 marks)
- (b) With the aid of diagrams, outline the process of bacterial replication by binary fission. (10 marks)

12. (a) Define the term sterilization. (2 marks)
- (b) Explain **four** precautions to be taken when preparing materials for sterilization in an oven. (8 marks)
- (c) Explain **five** factors that influence sterilization in an oven. (10 marks)
13. (a) Draw a well labelled diagram of a bacterial cell. (12 marks)
- (b) Explain **four** importance of bacterial cell membrane. (8 marks)
14. (a) Explain the use of each of the four reagents used in Gram staining. (8 marks)
- (b) Outline the procedure of carrying out Gram staining of a bacterial culture. (6 marks)
- (c) A student carrying out Gram staining obtained wrong results. Explain **three** errors which might have contributed to this. (6 marks)

15. Figure 1 shows domestic treatment of water.

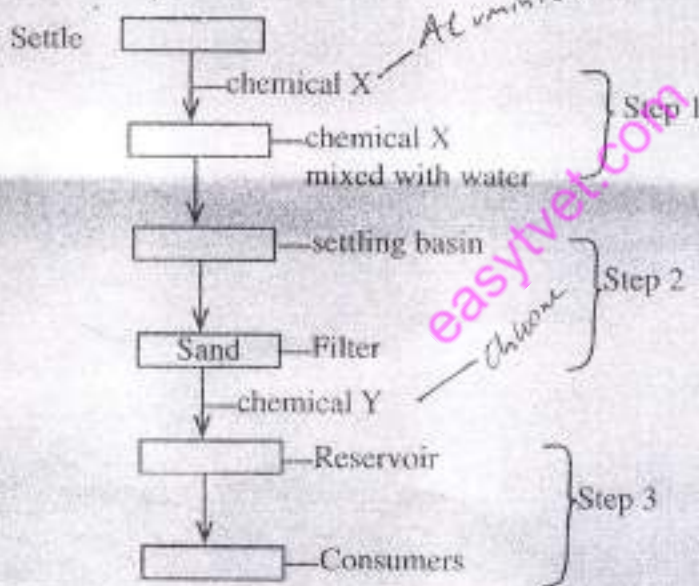


Figure 1

- (a) Identify chemical X and Y. (2 marks)
- (b) Apart from chemical Y, which other **three** chemicals can be used. (3 marks)
- (c) Explain what takes place in steps 1, 2 and 3. (9 marks)
- (d) Explain **three** methods used to test if water distributed is safe for human consumption. (6 marks)

THIS IS THE LAST PRINTED PAGE.