

2528/203
2922/203
ENVIRONMENTAL
MICROBIOLOGY
June/July 2020
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;

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 indicated.

Candidates should answer the questions in English.

This paper consists of 4 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 the questions in this section.

1. List **four** classes of micro-organisms. (4 marks)
2. Distinguish between bactericidal agent and bacteriostatic agent. (4 marks)
3. (a) State **two** sources of light used in microscopes. (2 marks)
(b) State the function of each of the following parts of a microscope:
 - (i) stage clips; (1 mark)
 - (ii) stage. (1 mark)
4. State **four** disadvantages of using dry heat sterilization method. (4 marks)
5. Draw the shapes of each of the following types of bacteria:
 - (a) bacilli; (1 mark)
 - (b) vibrio; (1 mark)
 - (c) spirilla; (1 mark)
 - (d) cocci. (1 mark)
6. Describe each of the following as used in mycology:
 - (a) coenocytic fungi; (2 marks)
 - (b) dimorphic fungi. (2 marks)
7. List **four** properties of industrial microbes used in production of antibiotics. (4 marks)
8. State **four** classes of bacteria based on their oxygen requirements. (4 marks)
9. Describe the process of culturing bacteria using the following methods:
 - (a) stab culture; (2 marks)
 - (b) lawn culture. (2 marks)
10. Distinguish between a broad spectrum and narrow spectrum antibiotics. (4 marks)

SECTION B (60 marks)

Answer any **THREE** questions from this section.

11. (a) With aid of diagrams, describe the **five** types of bacteria based on their flagella arrangement. (15 marks)
- (b) (i) Define the term pili as used in bacteriology. (1 mark)
- (ii) Describe the two types of pili. (4 marks)
12. (a) With the aid of diagrams, describe the **six** types of cocci bacteria. (12 marks)
- (b) Outline the procedure of carrying out gram staining on air-dried *E.Coli* smear. (8 marks)
13. (a) Outline the process of wine making. (12 marks)
- (b) State **four** differences between ale and lager beers. (8 marks)
14. (a) Figure 1 shows a biogas reactor.

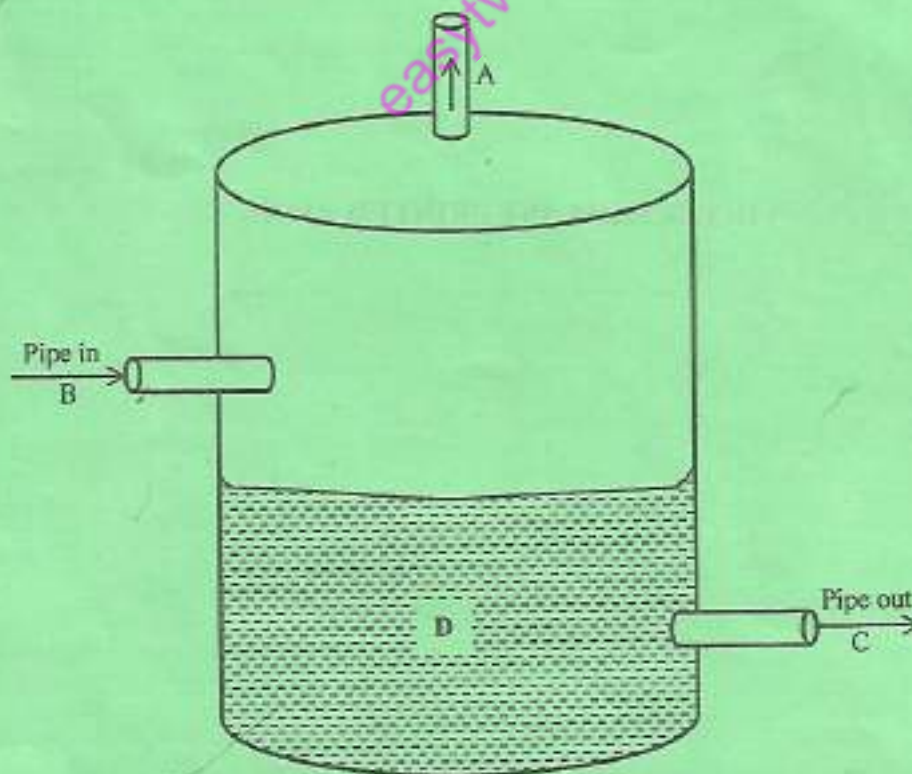


Fig.1

- (i) Identify the materials labelled A, B, C and D. (4 marks)
- (ii) List five materials that can be used in stream B. (5 marks)
- (iii) Name any bacteria in material D. (1 mark)
- (iv) State six uses of product A. (6 marks)
- (b) State four advantages of biogas to the environment. (4 marks)
15. (a) Describe each of the following:
- (i) wastewater; (4 marks)
- (ii) wastewater treatment. (4 marks)
- (b) List four wastewater contaminants found in domestic sewage. (4 marks)
- (c) Name four sources of domestic wastewater. (4 marks)
- (d) State four materials removed during primary treatment of wastewater. (4 marks)

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