

2528/203
2922/203
ENVIRONMENTAL MICROBIOLOGY
June/July 2019
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 shown.

Candidates should answer the questions in English.

This paper consists of 4 printed pages.

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

SECTION A (40 marks)

Answer ALL the questions in this section.



1. Define each of the following terms:
 - (a) sterilization; (2 marks)
 - (b) binary fission. (2 marks)
2. (a) Describe the shape of a cocci bacteria. (1 mark)
(b) Describe the cell arrangements of the following classes of cocci bacteria:
 - (i) Diplococci; (1 mark)
 - (ii) Streptococci; (1 mark)
 - (iii) Staphylococci. (1 mark)
3. List four functions of capsid in a virus. (4 marks)
4. (a) Outline the process of heat fixation of smear. (2 marks)
(b) State two functions of heat fixation of smears. (2 marks)
5. Name any four resistance mechanism of pathogens to antibiotics. (4 marks)
6. Distinguish between a common pili and sex pili found in bacteria. (4 marks)
7. Draw the shapes of the following colonies growing in a culture media:
 - (a) Flat; (1 mark)
 - (b) Raised; (1 mark)
 - (c) Convex; (1 mark)
 - (d) Umbonate. (1 mark)
8. Draw a labelled diagram of an inoculating loop. (4 marks)
9. Draw a labelled diagram of a fixed-dome biogas digester. (4 marks)
10. Use a diagram to illustrate the structure of a septate fungal hypha. (4 marks)

SECTION B (60 marks)

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

11. (a) Draw the **three** types of endospores based on their location within the bacterial cell. (6 marks)
- (b) (i) Name the **two** stains used in negative staining of a bacterial capsule. (2 marks)
- (ii) Outline the procedure for negative staining of a capsule. (12 marks)
12. (a) Explain the **three** functions of a capsule in a pathogenic bacteria. (6 marks)
- (b) (i) Describe the structure of flagella. (2 marks)
- (ii) With the aid of a diagram, describe the type of flagella in bacteria. (12 marks)
13. (a) Describe any **four** practices of personal hygiene that ensures safety in the laboratory. (8 marks)
- (b) Explain **four** routes through which workers are exposed to infections in the laboratory. (12 marks)
14. (a) Explain the **four** classes of infective microorganisms. (12 marks)
- (b) Describe the **four** classes of laboratories based on their levels. (8 marks)
15. (a) Name the **four** essential ingredients of beer. (4 marks)
- (b) Use the flow chart shown in Figure 2 to answer the questions that follow.

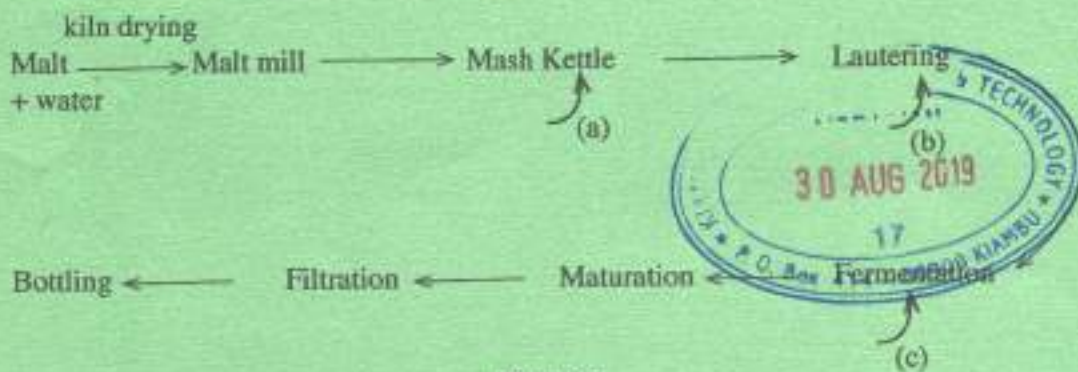


Figure 2

[Handwritten initials]

- (i) Name **two** enzymes produced during the malting process. (2 marks)
- (ii) State **three** reasons for Kiln-drying the malt before milling. (3 marks)
- (iii) Name the materials **a** and **c** added in the processes. (2 marks)
- (iv) State **three** functions of material **a**. (3 marks)
- (v) Describe the process of maturation of beer. (3 marks)
- (vi) List **three** types of containers used in bottling beer. (3 marks)



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