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

Turn over

SECTION A (40 marks)

*Answer **ALL** questions in this section.*

1. Explain the importance of the capsule on a bacterial cell. (4 marks)

2. State **four** methods of measuring bacterial growth. (4 marks)

3. Outline the procedure for sterilizing petri dishes using an oven. (4 marks)

4. State any **four** desired properties of *saccharomyces cerevisiae* in the production of beer. (4 marks)

5. (a) Define the term brewing. (2 marks)

   (b) Name the **two** types of brewery yeast strains. (2 marks)

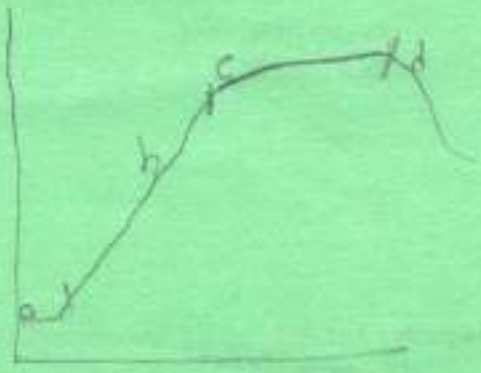
6. List any **four** classes of cocci bacteria. (4 marks)

7. Distinguish between a common pili and a sex pili in bacterial cells. (4 marks)

8. Outline the process of cultivating bacteria using stab culture method. (4 marks)

9. Differentiate between an ocular lens and an objective lens in a compound microscope. (4 marks)

10. Sketch the normal bacterial growth curve indicating the growth phases. (4 marks)



SECTION B (60 marks)

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

11. (a) Draw a labelled diagram of a capsulated bacterial cell. (8 marks)

(b) With the aid of a labelled diagram, outline the steps of clostridium bacterial multiplication by binary fission. (12 marks)

12. (a) Differentiate between white wine and red wine. (4 marks)

(b) Figure 1 represents the process of production of wine.

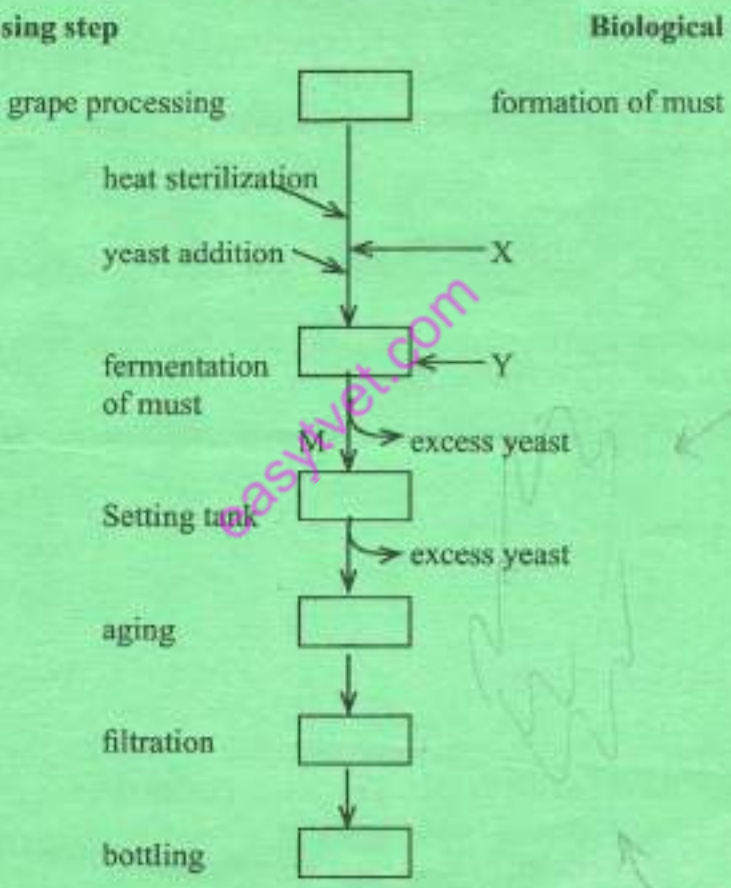


Figure 1.

(i) State **two** functions of process X. (2 marks)

(ii) Name the species of yeast used in process X. (1 mark)

(iii) Name **three** products in step Y. (3 marks)

(iv) Name the chemical that can be used to sterilize must instead of heating. (1 mark)

(v) State **two** reasons for removing excess yeast in step M. (2 marks)

(vi) State **three** conditions that must be met before filtration of the wine. (3 marks)

(vii) Describe **four** steps used in bottling of wine. (4 marks)

13. (a) Explain **four** categories of micro-organisms based on their risk potential to humans. (12 marks)

(b) Describe **four** safety precautions to be considered when working in a biosafety level one laboratory. (8 marks)

14. (a) Explain **five** operating conditions for optimal production of biogas. (10 marks)

(b) Explain the removal of the following biogas impurities prior to storage in compressed natural gas (CNG) cylinders:

(i) carbon dioxide; (2 marks)

(ii) hydrogen sulphide; (2 marks)

(iii) water. (2 marks)

(c) List **four** uses of biogas. (4 marks)

15. (a) Explain the use of the following reagents in Gram staining of bacteria:

(i) Crystal violet; (2 marks)

(ii) Gram's iodene; (2 marks)

(iii) Ethanol; (2 marks)

(iv) Counter stain. (2 marks)

(b) Draw the replication of cycle of bacteriophage. (12 marks)

THIS IS THE LAST PRINTED PAGE.