1903/102
APPLIED SCIENCE AND
LABORATORY PRACTICE
June/July 2023
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

CRAFT CERTIFICATE IN FOOD PROCESSING AND PRESERVATION TECHNOLOGY

MODULE I

APPLIED SCIENCE AND LABORATORY PRACTICE

3 hours

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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 **TWO** 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 6 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 (60 marks)

Answer ALL the questions in this section.

1. State the function of each of the following types of science laboratory equipment:

   (a) microscope; (1 mark)

   (b) weighing balance; (1 mark)

   (c) autoclave; (1 mark)

   (d) waterbath. (1 mark)

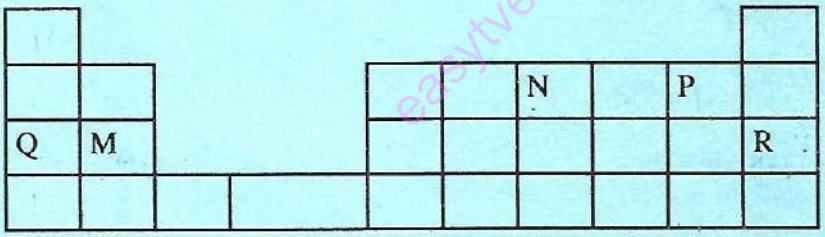
2. Differentiate between eukaryotic cell and prokaryotic cell based on membrane bound organelles and nucleus. (4 marks)

3. The following is part of the periodic table.

   (a) Identify the element that form giant covalent structures. (1 marks)

   (b) Identify the element that does not form compounds. (1 marks)

   (c) Write the chemical formula for the nitrite of M. (2 marks)



4. State **four** properties of magnetic field lines around a bar magnet. (4 marks)

5. Name **four** types of fitments found in a laboratory prep room. (4 marks)

6. Figures 1 and 2 shows the appearance of a plant cell before and after it has been put in a certain solution respectively. Explain the cause of the appearance of the cells. (4 marks)

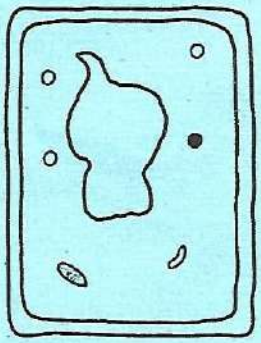


Fig. 1

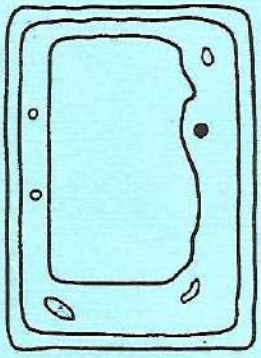


Fig. 2

7. Tin, nickel, copper and cobalt are metals in a science laboratory. Identify the:

(a) magnetic metals; (2 marks)

(b) non-magnetic metals. (2 marks)

8. On complete combustion of a sample of a hydrocarbon, 3.52 g of carbon dioxide and 1.44 g of water was formed. Determine the molecular formula of the hydrocarbon. (4 marks)
(O = 16, C = 12 and H = 1 and RMM of hydrocarbon = 56).

9. Name **four** cryogenic liquids found in a science laboratory. (4 marks)

10. State the function of each of the following parts of male reproductive organ:

(a) Vas deferens; (1 mark)

(b) Epididymis; (1 mark)

(c) Tastes; (1 mark)

(d) Urethra. (1 mark)

11. Figure 3 shows plane mirrors inclined at an angle of 120° to each other. A ray of light makes an angle of 40° with the first mirror. By completing the ray diagram, determine the angle of reflection on the second mirror. (4 marks)

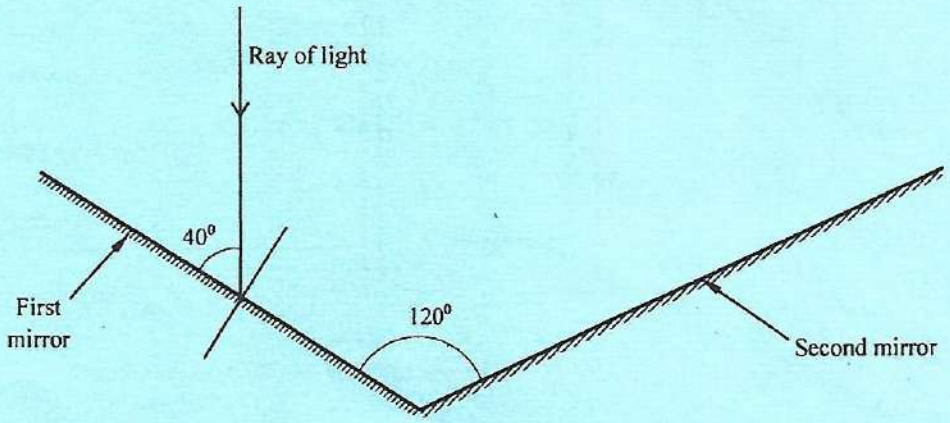


Fig. 3

12. Draw the structural bond-line formulae of the following compounds:

(a) Butane; (2 marks)

(b) Butyne. (2 marks)

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13. Explain the function of each of the following items found in the first aid room:

(a) Castar oil; (2 marks)

(b) Milk of magnesia. (2 marks)

14. State **four** characteristics of gaseous exchange surfaces for living organisms. (4 marks)

15. State **four** classes of fractures based on the level of severity. (4 marks)

SECTION B (40 marks)

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

16. Explain the importance of protecting the forest ecosystem in relation to:

(a) climate change; (6 marks)

(b) water conservation; (4 marks)

(c) biodiversity; (6 marks)

(d) pollution. (4 marks)

17. (a) Figure 4 shows a conductor **AB** connected to a galvanometer and placed between two permanent magnets.

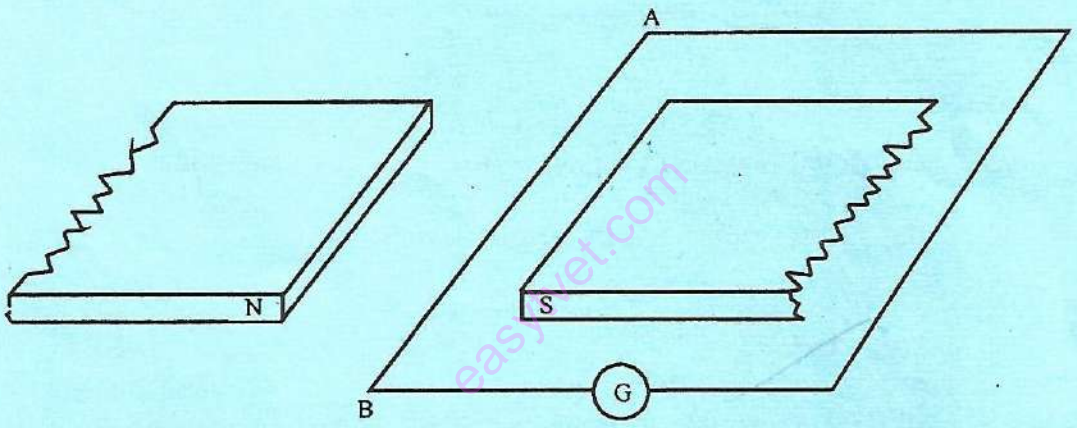

Fig. 4

(i) Conductor **AB** is moved perpendicular to the magnetic field. Explain the observation made on the galvanometer. (4 marks)

(ii) Explain the effect of moving the conductor faster. (2 marks)

(b) A transformer is used to step down 240 V to 12 V for use in an electric appliance operating at 0.5 A. If the primary coil has 600 turns, determine the:

(i) number of turns in the secondary coil; (3 marks)

(ii) current in the primary coil. (3 marks)

(c) Figure 5 shows electric circuit in which three capacitors are connected across a power supply. Determine the:

(i) total capacitance; (5 marks)

(ii) quantity of charge stored on 8 μF capacitor. (3 marks)

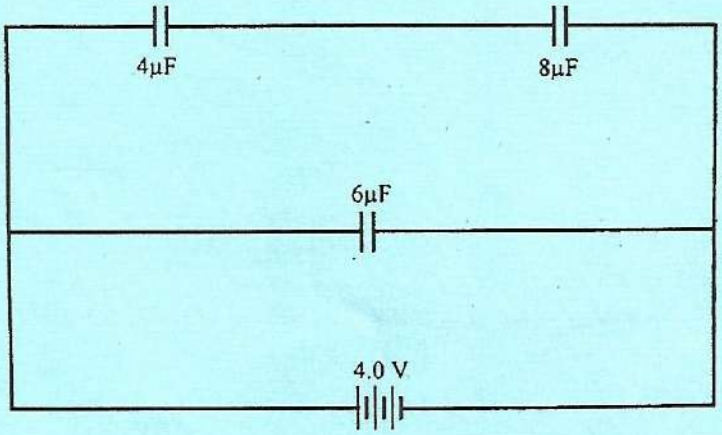

Fig. 5

18. (a) State **four** differences between softwood trees and hardwood trees. (8 marks)

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(b) Describe the types of natural defects in wood. (12 marks)

19. (a) State Charle's law. (2 marks)

(b) 100 cm^3 of a sample of ethane gas diffuses through a porous pot in 100 seconds. Calculate the molecular mass of gas Q if 100 cm^3 of the gas diffuses through the same porous pot in 121 seconds under the same conditions. (6 marks)

(c) The atomic number of phosphorous, sulphur and potassium are 15, 16 and 19 respectively. The formula for their ions are P^{3-}, S^{2-} and K^{+} respectively.

(i) Write the electronic configuration of the ions. (3 marks)

(ii) Arrange the ions in the order of increasing ionic radius. (3 marks)

(iii) Explain the reason for the order in (ii) above. (2 marks)

(d) (i) State the Lê Charteleer's principle. (2 marks)

(ii) State **two** factors which affect equilibrium constant in reversible chemical reactions. (2 marks)

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