

1903/102

APPLIED SCIENCE AND
LABORATORY PRACTICE

Oct. / Nov. 2022

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

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 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.

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SECTION A (60 marks)

Answer ALL questions in this section.

1. State **four** advantages of using metals for making laboratory benches. (4 marks)
- * 2. A given volume of ozone diffused from a certain apparatus in 96 seconds. Calculate the time taken by an equal volume of carbon IV oxide to diffuse from the apparatus under the same conditions. (4 marks)
3. Figure 1 shows a virtual image I, formed by convex lens. Draw a ray diagram to locate the object. (4 marks)

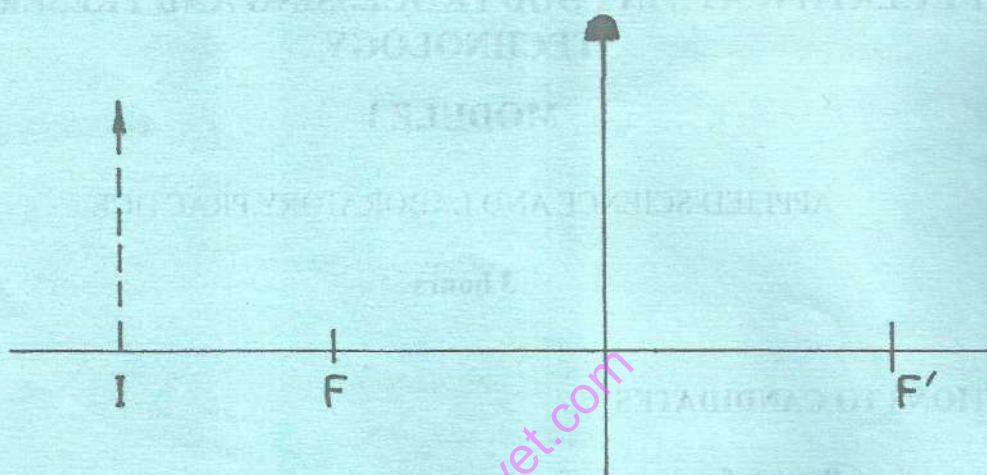


Fig.1

4. State **four** precautions observed when handling corrosive chemicals in the laboratory. (4 marks)
- * 5. An ion of phosphorus can be represented as ${}_{15}^{31}\text{P}^{3-}$. Draw a diagram showing the distribution of the electrons and the composition of nucleus of the ion of phosphorus. (4 marks)
- * 6. Differentiate between first angle and third angle orthographic projection. (4 marks)
7. Name **four** contents of a first aid kit. (4 marks)

- * 8. Figure 2 represents a nucleus of a living cell.

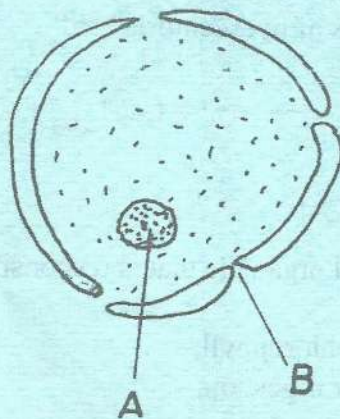


Fig. 2

- (a) Name the structures labelled A and B. (2 marks)
- (b) Explain the function of the structure labelled B. (2 marks)
9. Figure 3 illustrates a germinating seed.

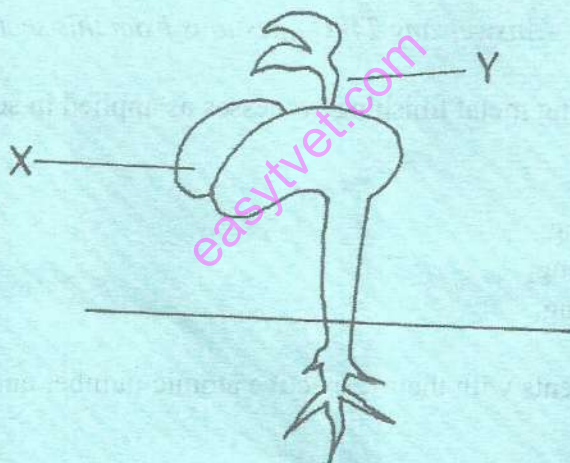


Fig. 3

- (a) Name the type of germination shown on the diagram. (2 marks)
- (b) State the function of the parts labelled X and Y. (2 marks)
10. Describe the procedure for cleaning oils and grease stains in a foods science laboratory. (4 marks)
11. Distinguish between wave amplitude and wave wavelength. (4 marks)
12. Name **four** methods of disposing wastes in a science laboratory. (4 marks)

13. Calculate the amount of calcium carbonate which would remain if 15.0 g of calcium carbonate was reacted with 0.2 moles of hydrochloric acid. (4 marks)



(C = 12, O = 16, Ca = 40)

14. (a) Name the plant cell organelle that is responsible for the following:
- (i) storage of chlorophyll; (1 mark)
 - (ii) intercellular digestion; (1 mark)
- (b) State **two** functions of vacuole in amoeba. (2 marks)
15. Using diagrams, describe the structures of:
- (a) butt joint; (2 marks)
 - (b) lap joint. (2 marks)

SECTION B (40 marks)

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

16. Discuss the following metal finishing processes as applied in science laboratory practice:
- (i) grinding; (6 marks)
 - (ii) sand-blasting; (4 marks)
 - (iii) buff-polishing; (5 marks)
 - (iv) electroplating. (5 marks)
17. Table 1 show elements with their respective atomic number and relative atomic mass.

Table 1

Element	Atomic Number	Relative Atomic Mass
Aluminium	13	27.0
Calcium	20	40.0
Carbon	-	12.0
Hydrogen	-	1.0
Magnesium	12	24.3
Neon	10	-
Phosphorus	15	-
Sodium	-	23

- (a) Complete the table by filling the missing atomic numbers and atomic mass. (6 marks)

(b) The melting point of hydrogen is $-259\text{ }^{\circ}\text{C}$. Calculate the melting point of hydrogen in Kelvin. (2 marks)

(c) Phosphorus has two allotropes X and Y whose melting points are $44.2\text{ }^{\circ}\text{C}$ and $59\text{ }^{\circ}\text{C}$ respectively. Identify, giving a reason, the allotrope with the highest density. (3 marks)

(d) Write the electronic arrangement for the following ions:

(i) Ca^{2+} (2 marks)

(ii) Mg^{2+} (2 marks)

(e) The mass numbers of the three isotopes of magnesium are 24, 25 and 26. Identify, with explanation, the mass number of the most abundant isotope of magnesium. (3 marks)

(f) Write the formula of the compound formed between aluminum and carbon. (2 marks)

18. (a) Explain the role of each of the following hormones in female reproduction:

(i) oestrogen hormone; (3 marks)

(ii) luteinizing hormone. (2 marks)

(b) Figure 4 shows parts of a female reproductive system.

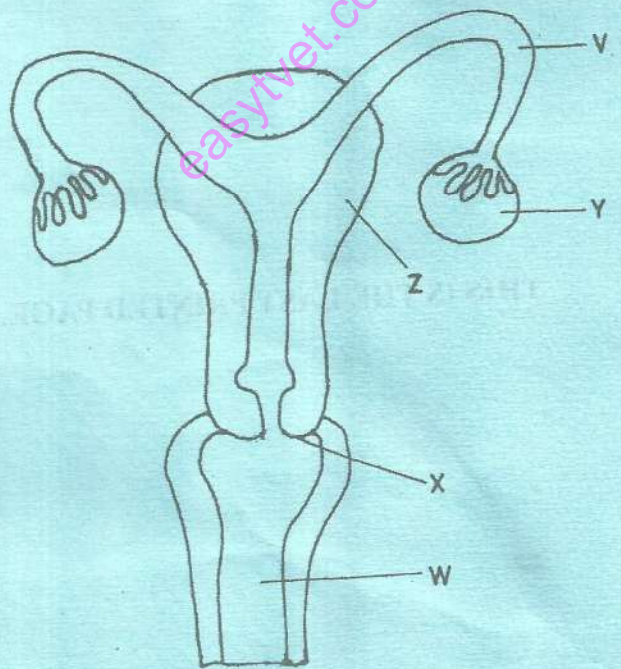


Fig.4

(i) Identify the parts labelled V, W, X, Y and Z. (5 marks)

(ii) Explain the functions of the parts labelled V, W, X, Y and Z. (10 marks)

19. (a) Describe how a magnet can be demagnetized using electronic method. (4 marks)
- (b) Figure 5 below shows the interface between glass and air. Complete the figure by drawing a ray diagram describing the critical angle. (4 marks)

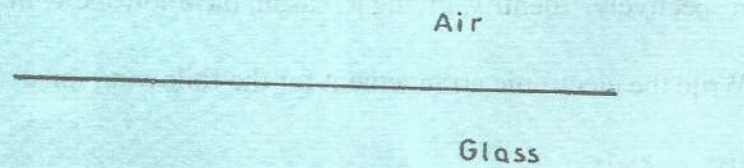


Fig.5

- (c) A monochromatic light of wavelength $4.5 \times 10^{-7} \text{ m}$ is incident on a metal surface of threshold frequency 5.5×10^{14} Hertz. Given that the speed of light c , is $3.0 \times 10^8 \text{ ms}^{-1}$ and Plank's constant h , is $6.63 \times 10^{-34} \text{ Js}$, Determine the:
- (i) work function of the metal surface; (3 marks)
- (ii) kinetic energy of the emitted photoelectrons. (5 marks)
- (d) State **four** applications of microwaves. (4 marks)

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