

1904/202

**PRINCIPLES OF LABORATORY AND
WORKSHOP PRACTICE II**

June/July 2023

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

CRAFT CERTIFICATE IN SCIENCE LABORATORY TECHNOLOGY

MODULE II

PRINCIPLES OF LABORATORY AND WORKSHOP PRACTICE II

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 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 indicated.

Candidates should answer the questions in English.

This paper consists of 5 printed pages.

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

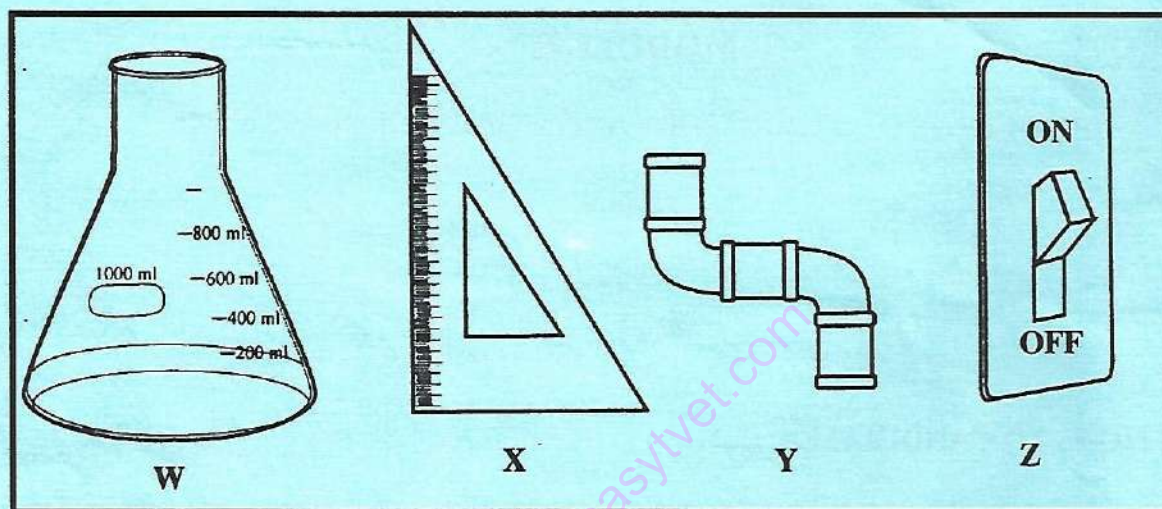
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SECTION A (60 marks)

Answer ALL questions in this section.

1. Explain why vacuum provides a good insulation in a cryogenic vessel. (4 marks)
2. Explain why a cryogen in a vessel is not accompanied in an elevator. (4 marks)
3. List **two** of each of the following that are necessary in production of ultra-high vacuum range:
 - (a) vacuum pumps; (2 marks)
 - (b) vacuum measuring devices. (2 marks)
4. Diagrams W, X, Y and Z represent products of plastic materials.



Identify the letter representing the product which would suitably be made from the following materials:

- (a) PVC; (1 mark)
 - (b) polyethylene; (1 mark)
 - (c) perspex; (1 mark)
 - (d) cellulose acetate. (1 mark)
5. Describe how to take a reading on a mercury barometer. (4 marks)
 6. State **four** reasons for culling laboratory animals. (4 marks)

7. Figure 1 shows the characteristic curve of a film speed.

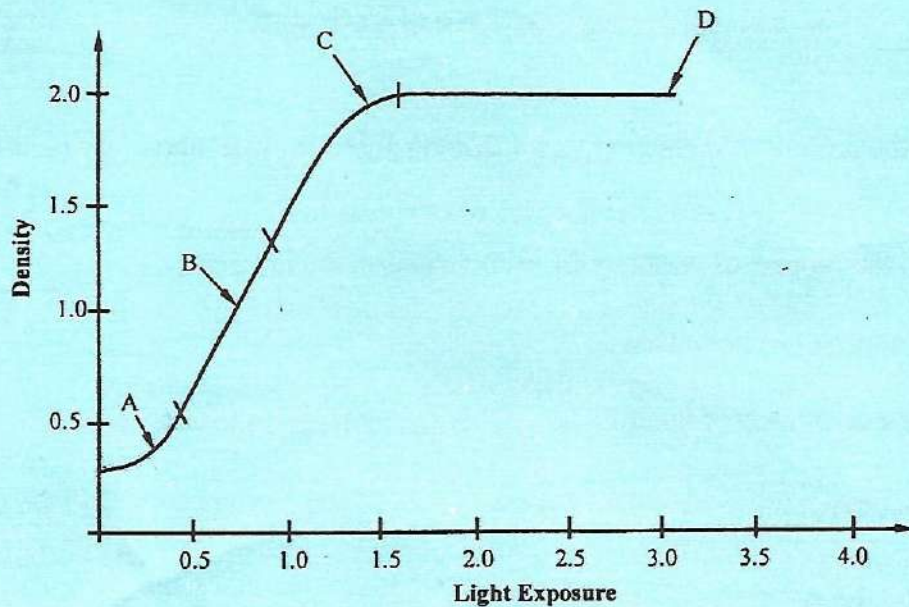


Fig. 1

- Identify the cardinal points labelled A, B, C and D on the curve. (4 marks)
8. Describe **four** ways of preventing devitrification in glass blowing. (4 marks)
9. Highlight **four** characteristics of a botanical garden. (4 marks)
10. State **four** challenges in stock taking. (4 marks)
11. Outline the process of replacing projector lens. (4 marks)
12. State the causes of each of the following problems during film development:
- (a) paper is white after development; (1 mark)
 - (b) paper is black after development; (1 mark)
 - (c) paper is pink; (1 mark)
 - (d) white specks on final prints. (1 mark)
13. Outline the procedure of turning on the glass blowing torch. (4 marks)
14. Distinguish between a purchase order and an invoice. (4 marks)
15. Describe the routine care and maintenance of microscope lens. (4 marks)

SECTION B (40 marks)

Answer any TWO questions from this section.

16. (a) Outline the process of collecting blood from the hind leg of a laboratory mouse. (10 marks)
- (b) Describe the process of washing the rabbit cages in the laboratory. (8 marks)
- (c) List **two** types of camera lenses. (2 marks)
17. (a) State the uses of each of the following tools in a botanical garden:
- (i) hand trowel; (2 marks)
- (ii) secateurs; (2 marks)
- (iii) shovel; (2 marks)
- (iv) rake; (2 marks)
- (v) saw. (2 marks)
- (b) Describe **five** benefits of mulching in botanical garden. (5 marks)
- (c) Outline the process of mulching flower beds in a botanical garden. (5 marks)
18. (a) State any **seven** components of a high vacuum system. (7 marks)
- (b) Describe:
- (i) (I) gauge pressure; (1 mark)
- (II) absolute pressure. (1 mark)
- (ii) Determine the gauge pressure if the atmospheric pressure is 2 atmospheres and absolute pressure is 6 atmospheres. (3 marks)

(c) Describe the following hazards associated with cryogenics:

- (i) extreme cold; (4 marks)
- (ii) flammability; (1 mark)
- (iii) asphyxiation. (3 marks)

19. (a) (i) Describe the term 'boil off' as used in a cryogenic vessel. (5 marks)
- (ii) Explain why vents and relief-valves in a cryogenic vessel are oriented away from personnel and equipment. (5 marks)

(b) Table I gives values of force acting on a plastic material and the corresponding extension produced.

Table I

Force (N)	0	125	213	350	395	387
Extension (cm)	0	1.3	3.0	8.0	13.5	16.0

- (i) Draw a graph of force (y-axis) against extension for the material. (7 marks)
- (ii) From the graph:
 - (I) state the property depicted by the material; (1 mark)
 - (II) state the type of plastic depicted; (1 mark)
 - (III) give an example of plastic in (II). (1 mark)

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