

1903/102
APPLIED SCIENCE AND
LABORATORY PRACTICE
Oct./Nov. 2021
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;

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 **four** environmental hazards that may occur when oil spills over a large surface area of the sea. (4 marks)
2. The electronic configuration of ions X^{2+} and Y^{2-} are 2.8 and 2.8.8 respectively.
 - (a) Write the electronic configurations of the elements X and Y. (2 marks)
 - (b) Write the formula of the compound formed by the reaction between X and Y. (2 marks)
3.
 - (a) Define anaerobic respiration. (2 marks)
 - (b) State **two** end products of anaerobic respiration in plants. (2 marks)
4. State **four** types of wounds that a laboratory technician is likely to suffer. (4 marks)
5. A solid weighs 16.5 N on the surface of the moon. The force of gravity on the moon is 1.7 N/kg. Determine the mass of the solid. (4 marks)
6. Describe each of the following woodwork joints:
 - (a) lap joint; (2 marks)
 - (b) butt joint. (2 marks)
7. Differentiate between eukaryotic cells and prokaryotic cells. (4 marks)
8. The relative formula mass of a hydrocarbon is 58. Draw and name two possible structures of the hydrocarbon. (C = 12; H = 1). (4 marks)
9. Explain the difference between stress and strain as used in metal work. (4 marks)

10. Figure 1 shows a graph of temperature against time when pure melting ice at 0°C is heated uniformly.

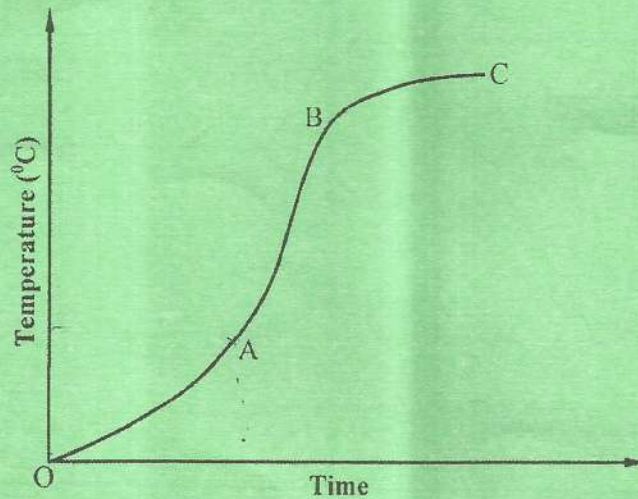


Figure 1

Explain what happens between parts:

- (a) OA; (2 marks)
- (b) AB. (2 marks)
11. Identify **four** utilities that are required in a standard laboratory. (4 marks)
12. State **four** structural differences between biceps and gut muscles. (4 marks)
13. Describe the orthographic projection as used in technical drawing. (4 marks)
14. (a) Figure 2 shows a trolley on a smooth surface being pulled by a constant force F . Sketch a graph of velocity against time for the motion of the trolley. (2 marks)

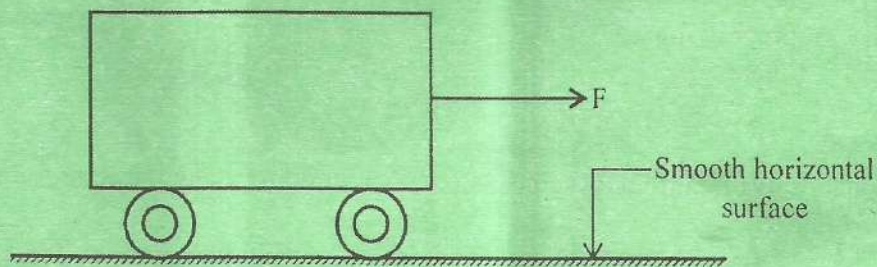


Figure 2

- (b) A parachute falling through the air attains a terminal velocity after a short time. State the reason why it attains the terminal velocity fast. (2 marks)

15. Figure 3 shows an energy level diagram.

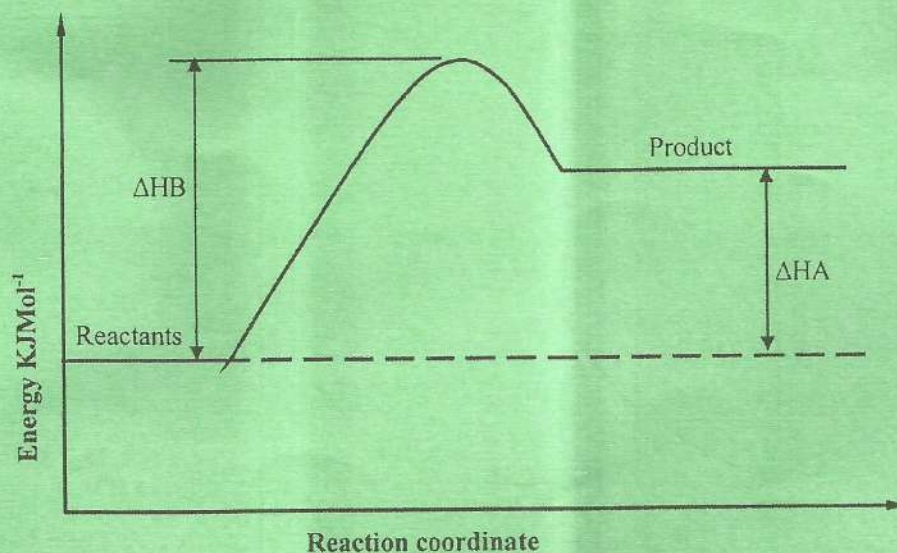


Figure 3

- (a) Name ΔHA . (1 mark)
- (b) Explain how ΔHB can be reduced and why. (3 marks)

SECTION B (40 marks)

Answer any TWO questions from this section.

16. (a) Describe how the insect pollinated flowers are adapted to pollination. (12 marks)
- (b) Describe the role of each of the following hormones in human menstrual cycle:
- (i) oestrogen; (3 marks)
 - (ii) progesterone; (3 marks)
 - (iii) luteinizing hormone. (2 marks)
17. (a) Explain **five** requirements considered when building chemical store for a standard laboratory. (10 marks)
- (b) Describe **five** types of fire extinguishers found in food technology laboratory. (10 marks)

18. (a) In an experiment, a piece of magnesium ribbon was cleaned with steel wool. 2.4 g of the cleaned magnesium ribbon was placed in a crucible and completely burned with oxygen. After cooling, the product weighed 4.0 g.
- Explain why it was necessary to clean the magnesium ribbon. (2 marks)
 - State the observation made in the crucible after burning. (2 marks)
 - Explain the reason for the observed increase in mass (2 marks)
 - Write an equation for the reaction that took place in the crucible. (2 marks)
 - The product in the crucible was shaken with water and filtered. Explain the observation made when blue and red litmus papers were dropped into the filtrate. (4 marks)
 - Calculate the volume of oxygen gas used during burning. The molar volume of gas = 24000 cm^3 at room temperature (5 marks)
- (b) 60 cm^3 of oxygen gas diffused through a porous partition in 50 seconds. Determine the length of time taken by 60 cm^3 of sulphur (IV) oxide gas to diffuse through the same partition under the same conditions ($S = 32, O = 16$). (3 marks)

19. (a) Figure 4 shows two coils A and B placed close to each other. A is connected to a steady D.C supply and a switch. B is connected to a sensitive galvanometer.

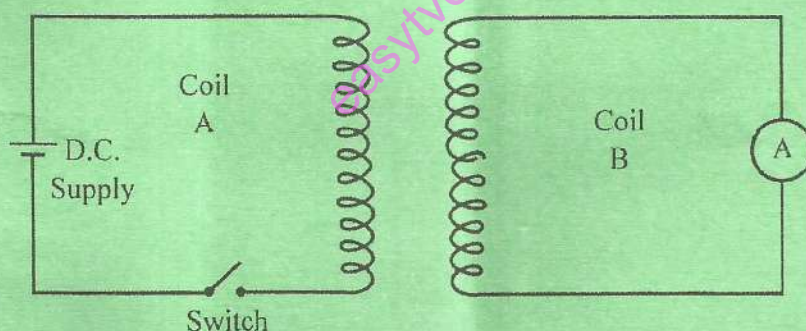


Figure 4

- State the observation made on the galvanometer (A) when the switch is closed. (3 marks)
- Explain what would be observed if the switch is then opened. (3 marks)

- (b) The primary coil of a transformer has 1000 turns and the secondary coil has 2000 turns. The primary coil is connected to a 240 V a.c mains supply.
- (i) Explain how an e.m.f is induced in the coil. (3 marks)
- (ii) Determine the secondary voltage. (4 marks)
- (iii) Determine the efficiency of the transformer given that the current in the primary coil is 0.20 A and the secondary coil is 0.80 A. (4 marks)
- (c) Figure 5 shows cross section of a conductor held between two magnets and carrying a current out of the paper. Indicate with an arrow the direction in which the conductor will move when its released. (1 mark)

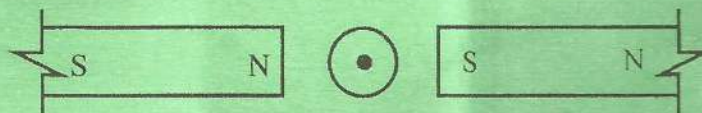


Figure 5

- (d) Explain why alternating current (A.C) is used for transmitting electricity over a long distance. (2 marks)

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