PAPER 2 1¼ hours
ESSAY
[100 marks]

This paper is in two parts: I *and* II. *Answer Question* 1 *in part* I *and any other* **four** *questions in part* II.

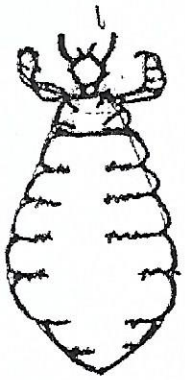
Answer **all** *the questions in your answer booklet.*

Credit will be given for clarity of expression and orderly presentation of material.

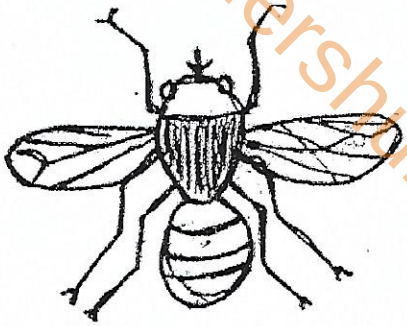
PART I
[40 marks]

Answer **all** *of Question* **1**.

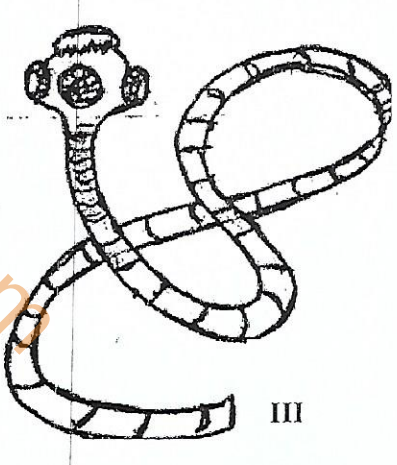
1. (*a*) The diagrams below are illustrations of three different organisms harmful to farm animals.
Study the diagrams carefully and answer the questions that follow.



I



II



III

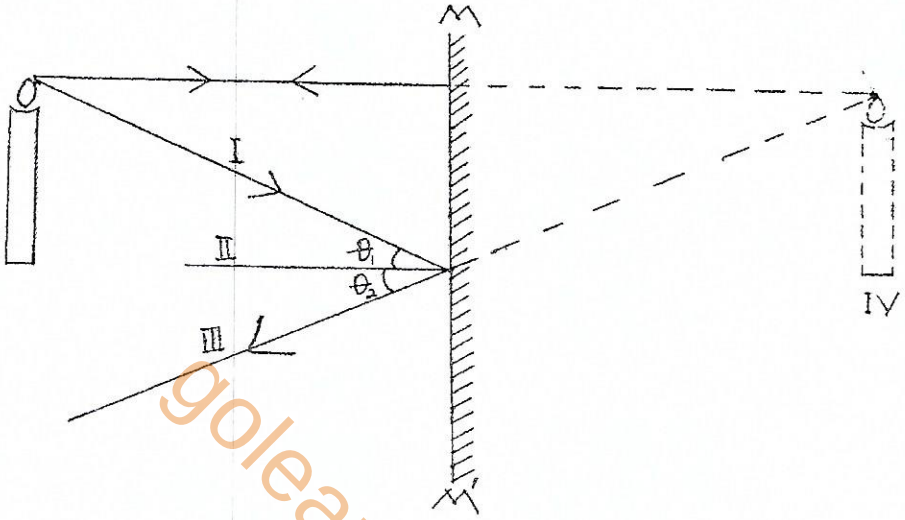
(i) Identify **each** of the organisms labelled **I, II** and **III**. [3 marks]

(ii) Which of the organisms is/are:
(α) parasite(s);
(β) pest(s).
[3 marks]

(iii) State **one** effect **each** of the following organisms on farm animals:
(α) **I;**
(β) **II;**
(γ) **III.**
[3 marks]

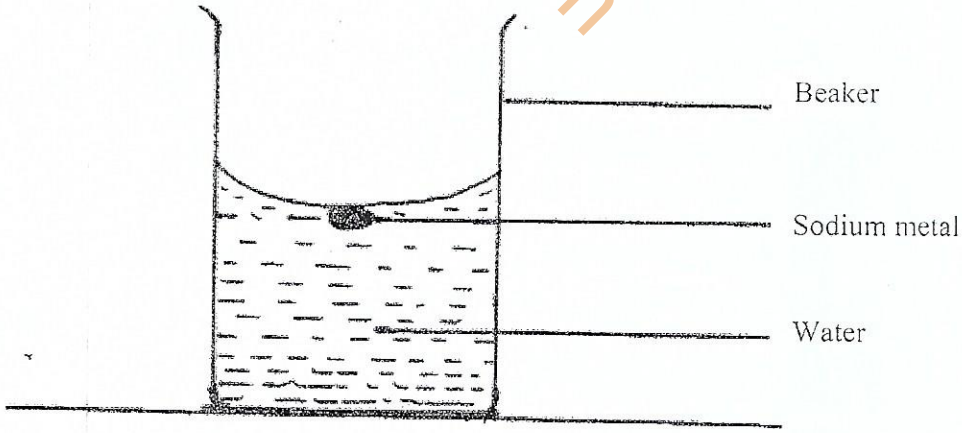
(iv) State **three** methods of controlling the organism labelled **III**. [3 marks]

(*b*) The diagram below illustrates a burning candle placed in front of a plane mirror *MM'* and an image of the candle formed in the mirror.
Study the diagram carefully and answer the questions that follow.



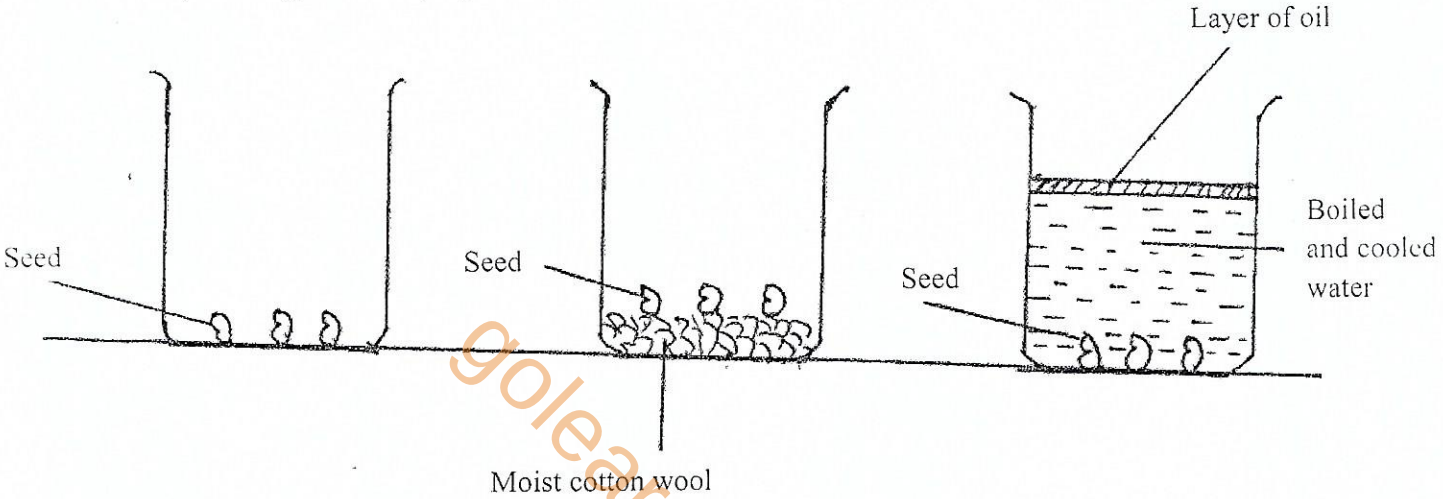
(i) Name the parts labelled **I**, **II**, **III** and **IV**. [4 marks]
(ii) State the relationship between angles θ_1 and θ_2. [1 mark]
(iii) Give **three** characteristics of **IV** in the diagram. [3 marks]
(iv) Explain why **IV** is represented in broken lines. [2 marks]

(*c*) In an experiment to investigate the reactivity of sodium, a piece of sodium metal was dropped in a beaker containing water. The experimental set-up is as illustrated below.
Study the set-up carefully and answer the questions that follow.



(i) State what would happen if a glowing splint was held at the mouth of the beaker. [2 marks]
(ii) Name the gas evolved. [1 mark]
(iii) Write a balanced chemical equation for the reaction that occurred. [3 marks]
(iv) Name **two** other metals that can react in a similar way as the sodium. [2 marks]

(*d*) An experiment to investigate the conditions for germination of viable bean seeds was carried out. The diagrams below are illustrations of the different conditions in which the seeds were kept. The beakers labelled **A**, **B** and **C** containing the seeds were kept at room temperature.
Study the diagrams carefully and answer the questions that follow.



(i) State what would happen to the seeds in **each** of the beakers labelled **A**, **B** and **C** when the experiment was observed after five days. [3 marks]
(ii) Give reasons for **each** of your answers in (i). [4 marks]
(iii) Why was oil spread on the surface of the water in the beaker labelled **C**? [2 marks]

PART II
[60 marks]

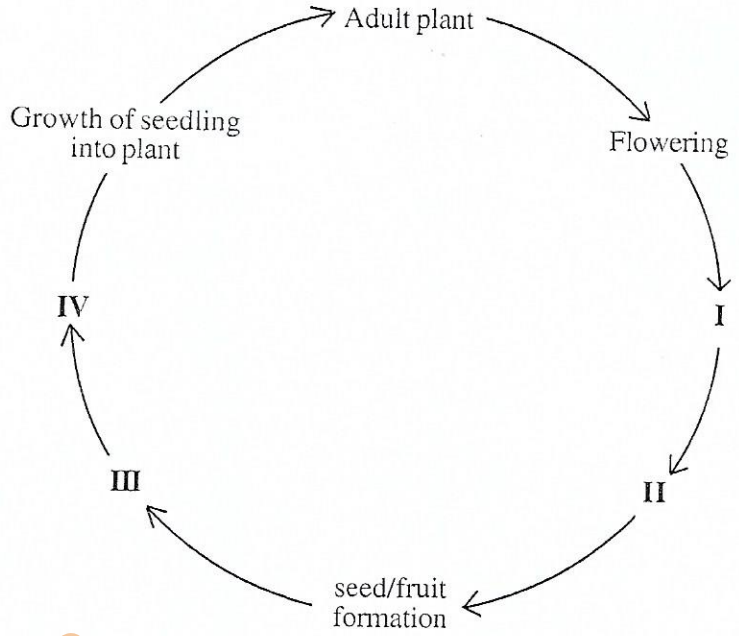
Answer **four** *questions* **only** *from this section.*

2. (*a*) (i) What is *weather*?
(ii) State **two** differences between *weather* and *season*. [4 marks]

(*b*) State the composition of **each** of the following alloys:
(i) steel;
(ii) stainless steel. [3 marks]

(*c*) List **four** benefits of vegetables to humans. [4 marks]

(*d*) The diagram below is an illustration of life-cycle of a flowering plant.



Name **each** of the stages labelled **I**, **II**, **III** and **IV**. [4 marks]

3. (*a*) Explain how
(i) lithium atom becomes **positively** charged.
(ii) oxygen atom becomes **negatively** charged. [2 marks]

(*b*) (i) What is *potential energy*?
(ii) A coconut of mass 2 kg is on a tree 5 m tall. Determine the potental energy of the coconut at this height. [*Take* g = 10 m s^{-2}.] [5 marks]

(*c*) State **four** causes of teenage pregnancy. [4 marks]

(*d*) State **four** uses of soil in agriculture. [4 marks]

4. (*a*) Give **four** health benefits of water to humans. [4 marks]

(*b*) (i) State **two** ways in which crop rotation is important in crop production.
(ii) Distinguish between *mixed cropping* and *mixed farming*. [4 marks]

(*c*) (i) What is a *fuse*?
(ii) Name the colour code of the wire on which a fuse is placed in a three-pin plug. [3 marks]

(*d*) (i) In a tabular form, state **three** differences between *osmosis* and *diffusion*.
(ii) State **one** way in which osmosis is similar to diffusion. [4 marks]

5. (*a*) (i) What is *balanced* ration in animal nutrition?
(ii) State **two** benefits of balanced ration to poultry. [4 marks]

(*b*) List **four** hazards that may be encountered in teaching and learning of science. [4 marks]

(*c*) Name the parts of the circulatory system of humans. [3 marks]

(*d*) (i) What is a *simple machine*?
(ii) State **two** methods of overcoming friction in everyday activities. [4 marks]

6. (*a*) (i) What is a *magnetic field*?

(ii) To which class of mixture does **each** of the following belong?

(α) Smoke

(β) Air

(γ) Bronze

[5 marks]

(*b*) (i) What is *plaque* in human dentition?

(ii) State the function of chlorophyll in photosynthesis.

[3 marks]

(*c*) Identify the scientific principle underlying the operation of **each** of the following industries:

(i) kenkey production;

(ii) salt making;

(iii) fish smoking;

(iv) biogas production.

[4 marks]

(*d*) (i) What is *plant parasite*?

(ii) Give **one** example of a plant parasite.

[3 marks]

END OF ESSAY TEST

Answer **all** *the questions.*

Each question is followed by four options lettered **A** *to* **D**. *Find the* **correct** *option for* **each** *question and shade in* **pencil** *on your answer sheet the space which bears the same letter as the option you have chosen. Give only* **one** *answer to* **each** *question. An example is given below.*

Which of the following substances is **not** an element?

A. Aluminium
B. Ammonia
C. Oxygen
D. Sodium

The correct answer is Ammonia, *which is lettered* **B** *and therefore answer space* **B** *would be shaded.*

⊏A⊐ ⊏B⊐ ⊏C⊐ ⊏D⊐ ⊏E⊐

Think carefully before you shade the answer spaces. Erase completely any answer you wish to change.

Do all rough work on this question paper.

Now answer the following questions.

1. Brass is an alloy of
   A. iron and carbon.
   B. zinc and copper.
   C. iron and copper.
   D. copper and tin.

2. An example of inorganic fertilizer is
   A. ammonium nitrate.
   B. cow dung.
   C. farmyard manure.
   D. poultry dropping.

3. The component of the human blood which transports oxygen to all parts of the body is
   A. plasma.
   B. platelets.
   C. red blood cells
   D. white blood cells.

4. The importance of the fuse in an electrical circuit is to
   A. regulate the voltage.
   B. prevent damage to electrical appliances.
   C. alter the flow of current in the circuit.
   D. minimize the use of current.

5. Which of the following step(s) is/are required in the scientific method?
   I. Formulation of hypothesis
   II. Identification of the problem
   III. Experimentation

   A. I only
   B. II only
   C. II and III only
   D. I, II and III

6. Which of the following food items produces amino acids as end product of digestion?
   A. Cabbage
   B. Fish
   C. Margarine
   D. Rice

7. The process of increasing the strength of a signal using a transistor is known as
   A. amplification.
   B. biasing.
   C. doping.
   D. switching.

8. The physical arrangement of soil particles into aggregates is termed
   A. soil porosity.
   B. soil profile.
   C. soil structure.
   D. soil texture.

9. The solvent which is **most** effective in washing bitumen from the hand is
   A. acid.
   B. alcohol.
   C. kerosene.
   D. water.

10. A piece of stone could be classified as an opaque material because it
    A. absorbs all the light incident on it.
    B. does not absorb light incident on it.
    C. allows all the light incident on it to pass through it.
    D. does not allow light incident on it to pass through it.

11. Fish swims in water with little resistance because it possesses
    A. gills.
    B. scales.
    C. caudal fins.
    D. streamlined body.

12. Which of the following conditions promote(s) rusting of iron?
    I. Air
    II. Moisture
    III. Oil
    A. I only
    B. II only
    C. I and II only
    D. II and III only

13. The change in the volume of water when a piece of stone is dropped into it is equal to the
    A. density of the stone.
    B. mass of the stone.
    C. volume of the stone.
    D. weight of the stone.

14. The second stage in the life cycle of a mosquito is the
    A. egg.
    B. imago.
    C. larva.
    D. pupa.

5. Which of the following objects could be attracted by a magnet?
   A. Copper chain
   B. Gold chain
   C. Steel blade
   D. Aluminium spoon

16. The knowledge of soil texture is important because it
   A. influences plant population.
   B. determines the planting distance.
   C. determines the type of crop to be grown.
   D. influences the method of pest control.

17. How many atoms are present in $CaCl_2$?
   A. 2
   B. 3
   C. 4
   D. 5

18. The transfer of heat from the bottom to the top of a beaker containing water is by
   A. absorption.
   B. conduction.
   C. convection.
   D. radiation.

19. An example of a chemical compound is
   A. aluminium.
   B. ammonia.
   C. oxygen.
   D. phosphorus.

20. The type of the human teeth used for biting food substances is
   A. canines.
   B. incisors.
   C. molars.
   D. premolars.

21. Which of the following heavenly bodies is a star?
   A. Jupiter
   B. Moon
   C. Sun
   D. Venus

22. Which of the following organisms is an endoparasite?
   A. Fleas
   B. Louse
   C. Tapeworm
   D. Tick

23. The part of the plant where pollination occurs is the
   A. flowers.
   B. leaves.
   C. roots.
   D. stems.

24. Which of the following substances is capable of neutralizing an acid?
    A. Vinegar
    B. Water
    C. Sodium chloride
    D. Sodium hydroxide

25. Droplet infection is the method by which
    A. diseases are transmitted from animals to plants.
    B. infected animals are processed.
    C. human beings protect themselves from diseases.
    D. diseases are spread through the air.

26. An example of a derived quantity is
    A. length.
    B. mass.
    C. time.
    D. velocity.

27. A structure in the human reproductive system which stores sperms temporarily is the
    A. epididymis.
    B. penis.
    C. scrotum.
    D. vulva.

28. Which of the following statements about diffusion is/are **correct**?
    I. It involves the movement of water molecules only.
    II. It occurs in both gases and liquids.
    III. It involves a semi-permeable membrane.

    A. I only
    B. II only
    C. I and II only
    D. I, II and III

29. A farming system which requires **at least** three years programme is
    A. mixed cropping.
    B. crop rotation.
    C. organic farming.
    D. mixed farming.

30. The component of a living cell responsible for respiration is
    A. chloroplast.
    B. mitochondrion.
    C. nucleus.
    D. vacuole.

31. Which of the following statements about a second class lever is **correct**? The
    A. pivot is between the load and the effort.
    B. pivot and the load are at the same position.
    C. load is between the effort and the pivot.
    D. effort is between the load and the pivot.

32. One advantage of soft water over hard water is that soft water
A. has a pleasant taste.
B. can prevent heart diseases.
C. does not waste soap.
D. forms scales in kettles.

33. The gas produced when glucose is oxidized during aerobic respiration is
A. hydrogen.
B. nitrogen.
C. oxygen.
D. carbon dioxide.

34. The systematic name for N_2O is
A. nitrogen (I) oxide.
B. nitrogen (II) oxide.
C. nitrogen (III) oxide.
D. nitrogen (IV) oxide.

35. A husbandry practice which involves the removal of unwanted plant parts is known as
A. mulching.
B. pruning.
C. thinning.
D. pricking out.

36. The number of *p-n* junctions in a transistor is
A. 1.
B. 2.
C. 3.
D. 4.

37. Fruits dispersed by wind
A. have hairs.
B. are sticky.
C. are succulent.
D. have hooks.

38. Substances that burn living tissues when they come into contact with these tissues are considered
A. corrosive.
B. flammable.
C. irritant.
D. toxic.

39. The function of the platelets in the circulatory system of humans is to
A. transport oxygen.
B. transport carbon dioxide.
C. clot the blood.
D. defend the body.

40. Energy is the
A. force to move an object.
B. weight of the body.
C. ability to do work.
D. power to carry an object.

END OF PAPER