

INTEGRATED SCIENCE

1. GENERAL COMMENTS

The standard of the paper is the same as that of previous years. Candidates' performance, on the whole, declined as compared to last year's.

2. SUMMARY OF CANDIDATES' STRENGTHS

- (1) Most candidates were precise with their answers
- (2) Most candidates showed good understanding of the electron configuration as they were able to draw and show the distribution of electrons in the various shells for potassium
- (3) Most candidates were able to differentiate between pests and parasites
- (4) There was an improvement in the spelling of scientific words even though few candidates still could not write them correctly.

3. SUMMARY OF CANDIDATES' WEAKNESSES

- (1) Candidates failed to read and understand the demand of the questions; such as the difference between state, name, explain, define and 'what' is as used in the questions. Example in Question 1(d)(v) candidates were to explain how the solid portion of the solution named in (iii) could be obtained. The response from some candidates was just "evaporation".
- (2) Writing of the formula for compounds was a big challenge for many candidates.
- (3) Some candidates recopied the questions before answering and it made them not to be able to answer all the number of questions required.
- (4) Lack of understanding of what derived quantities are.

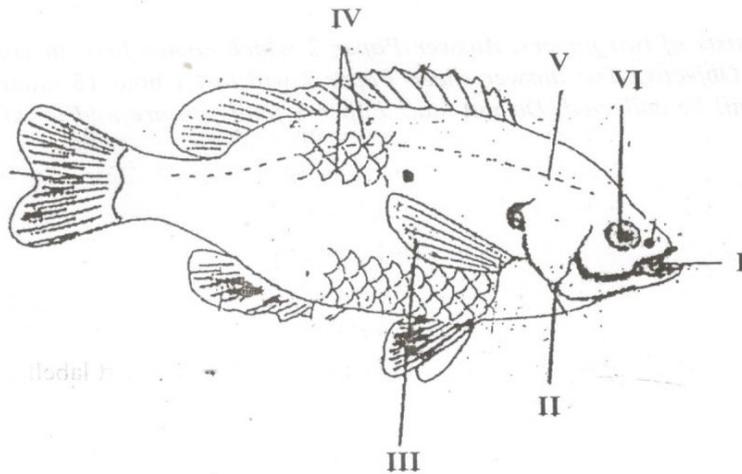
4. SUGGESTED REMEDIES

- (1) Teachers must make time and teach candidates the difference between the terms, "explain", "what is", "state" etc.
- (2) Teachers should try as much as possible to take candidates through the entire topics in the syllabus before they write their examinations.
- (3) More exercises on every topic taught must be given to the students as a guide in helping them to revise.
- (4) Candidates should be encouraged to use past questions in their studies.

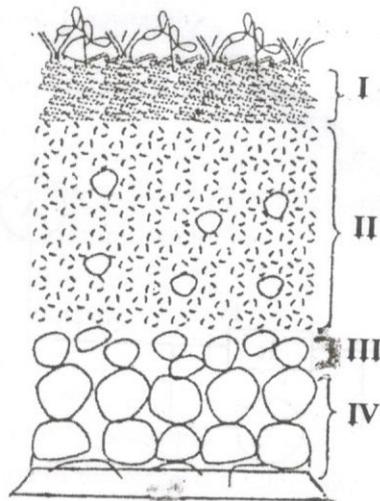
5. DETAILED COMMENTS

Question 1

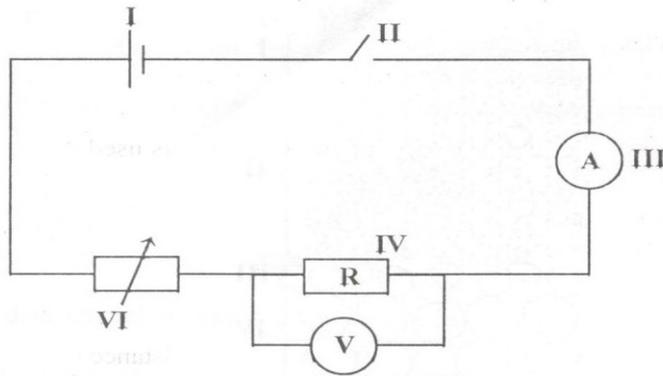
- (a) The diagram below is an illustration of a fish.
Study the diagram carefully and answer the questions that follow.



- (i) Identify the fish.
(ii) Name each of the parts labelled I, II, IV, V.
(iii) Name the habitat of the fish.
(iv) Explain how each of the parts III and VI enables the fish adapt to its habitat.
- (b) The diagram below is an illustration of a section through the soil.
Study the diagram carefully and answer the questions that follow.



- (i) What does the diagram represent?
- (ii) Name each of the parts labelled I, II, III, IV.
- (iii) Which part of the diagram:
- (α) is the richest in humus?
- (β) is the habitat for soil organisms?
- (γ) undergoes weathering?
- (iv) What is the effect of heavy rainfall on the part labelled I?
- (c) The diagram below is an illustration of an electrical circuit.
Study the circuit and answer the questions that follow.



- (i) Name each of the parts labelled I, II, IV, VI.
- (ii) State the energy transformation that takes place in:
- (α) I;
- (β) IV.
- (iii) State the S.I. units of the quantity measured by each of the parts labelled
- (α) III;
- (β) V.
- (iv) State the function of the part labelled VI.
- (d) In an experiment, equal volumes and equal concentrations of dilute hydrochloric acid and dilute sodium hydroxide solutions were each placed in different test tubes.

Read the following statements carefully.

- I. Both red and blue litmus papers were dipped into each of the solutions in turns.
- II. Equal volumes of the solutions were mixed to obtain a third solution.
- III. Both red and blue litmus papers were dipped into the third solution.

Use the information provided to answer the following questions.

- (i) Explain briefly how you can identify each of the solutions.
 - (α) Hydrochloric acid;
 - (β) Sodium hydroxide.
- (ii) State the type of reaction that occurred when the two solutions were mixed.
- (iii) What type of solution was formed when the reaction stated in (ii) occurred?
- (iv) State what would be observed when both red and blue litmus papers were dipped into the third solution.
- (v) Explain how the solid portion of the solution named in (iii) could be obtained.

- (a) The fish is Tilapia or a Bony fish. Most candidates did identify it as such. Wrong spellings were presented by some candidates such as: “Tileapeal, Tilapse, born fish”. Labelled parts were correctly named. Functions of parts labelled III and VI were correctly spelled out.

Very few candidates named the correct habitat of the specimen which is fresh water/fish pond/brackish water/lagoon/lake. Most candidates named the habitat as aquatic or sea which was wrong.

- (b) Most candidates represented the diagram correctly as soil profile and yet named the labelled parts I, II, III, IV as horizon A, B, C D respectively instead of top soil, sub soil, weathered rock and parent rock.

Other candidates also named the labelled parts as humus, clay, sand, gravel.

- (c) Most candidates had no problem in naming the labelled parts as shown in the circuit diagram. However, a few of them lost marks for naming labelled part I as battery instead of cell, and wrongly spelling “resistor” (part labelled IV).

A large number of candidates named the S.I. unit measured by part labelled III as ohms instead of ampere. A few who named it correctly wrote the unit with capital A, just as they named the unit for part labelled IV as Volt. The correct units are ampere or A, and volt or V.

The function of part labelled VI is to control or vary current, not just allowing current to pass through as stated by most candidates.

- (d) The acid and the base were correctly identified by most candidates using blue and red litmus papers. The type of reaction i.e. neutralization, and solution formed i.e. salt or neutral were also correctly stated by most candidates.

Most candidates failed to explain, but simply wrote “evaporation” and thus lost some marks.

Question 2

- (a) (i) **What is an ion?**
(ii) **State two methods of softening hard water.**
- (b) (i) **Differentiate between pests and parasites as used in agriculture.**
(ii) **Give an example each of a:**
(α) **pest;**
(β) **parasite.**
- (c) (i) **What is work?**
(ii) **A force of 10 N causes a body to move a distance of 5.2 m in the direction of the force. Calculate the work done.**
- (d) **Name two diseases associated with the circulatory system of humans.**

- (a) (i) While most candidates correctly explained ion as a charged atom or an atom gaining or losing electron, few of them described it as a metal which reacts with water to form rust.
- (ii) Most candidates correctly mentioned boiling as a method of softening hard water. Other methods like distillation, addition of washing soda and de-ionization escaped them.
- (b) Most candidates described pests as organisms which cause damage to crops. Only a few of them could not describe a parasite correctly to earn a mark. Parasites are also organisms. They live in or on the body of a host, feed on the host and thus cause harm to it.
- (c) (i) A force should move a body from place to another in the direction of the force for work to be done. A force moving alone without a load, as many candidates indicated, cannot be said to have done any work.
- (ii) Most candidates calculated work done correctly, using the formula $\text{work} = \text{force} \times \text{distance}$, and substituted the figures given to obtain the correct answer as 52 Joules. Yet other candidates substituting same figures given i.e. 10×5.2 , obtained 5.2 joules or 520 joules. Some of the candidates failed to provide the correct unit i.e. J or Nm.
- (d) Hypertension and hypotension are the popular diseases mentioned as associated with the circulatory system of humans. Other diseases not considered included arteriosclerosis, piles, leukaemia, etc.

Question 3

- (a) (i) **What is malnutrition?**
(ii) **State one symptom each of the following deficiency disease:**
(α) **scurvy;**
(β) **rickets.**
- (b) **Draw the potassium atom and show the distribution of electrons in its shells.**
[K = 19]
- (c) (i) **Define potential energy.**
(ii) **An object of mass 10 kg is moving at a velocity of 2 ms⁻¹.**
Calculate the kinetic energy of the object.
- (d) **State one example each of:**
(i) **macro nutrients;**
(ii) **micro nutrients.**

- (a) Most candidates expressed knowledge about malnutrition as a condition associated with lack of adequate nutrients in a person's diet. Symptoms of scurvy and rickets are unknown to most candidates – some gave lack of vitamins as symptom. Candidates failed to realize that symptoms are signs / features we can see/feel. Hence scurvy has symptoms including bruises, bleeding gums, rashes, fatigue etc. For rickets, delayed growth, bow legs, pains in the spine are some of the symptoms.
- (b) Most candidates scored full marks for drawing a four-shelled atom, with electron distribution of 2, 8, 8, 1. However, only a few showed a nucleus for the atom to score an extra mark.
- (c) (i) Only a few candidates scored full marks for definition of potential energy. Most of them described it as energy possessed by a body "at rest". Instead of energy possessed by a body by virtue of its position.
- (ii) Most candidates messed up with the calculation. Even the few who wrote the formula correctly could not substitute the figures given to obtain the correct answer. It should have been
- $$\begin{aligned} \text{K.E.} &= \frac{1}{2} MV^2 \\ &= \frac{1}{2} \times 10 \times 2 \times 2 \\ &= 20 \text{ joules / J} \end{aligned}$$

- (d) For unknown reasons, most candidates (perhaps all) candidates limited themselves to the same two reasons i.e. soil air is required to decompose organic matter; plant roots need soil air for growth. Other reasons not considered include the following:

Soil air is needed for absorption of nutrients and water by roots; for seed germination, for respiration in roots and soil organism etc.

Question 4

- (a) (i) **Explain the term hazard.**
(ii) **List two safety precautions against hazards in the teaching and learning of science.**
- (b) **In a tabular form state three differences between osmosis and diffusion.**
- (c) (i) **What is weather?**
(ii) **State two differences between weather and season.**
- (d) (i) **What is a fertile soil?**
(ii) **State two factors that cause loss of soil fertility.**

- (a) Most candidates expressed knowledge about hazards, as a potential danger which could cause harm to a person or do damage to property. Wearing of protective clothing was the only precaution that most candidates mentioned.

Routine maintenance of equipment, closing all taps before leaving the laboratory, switching off electrical points, mounting of hazard signs etc escaped candidates' attention.

- (b) The only difference between osmosis and diffusion which most candidates described correctly is that while the former process involved a semi-permeable membrane, the latter process does not use semi-permeable membrane. Other differences either poorly described or not mentioned at all, include the following. In osmosis only water molecules move, in diffusion solute molecules move.

In osmosis water moves from a dilute solution to concentrated solution while in diffusion solute molecules move from concentrated solution to a dilute solution. Osmosis occurs in liquids, diffusion occurs in liquids and gases.

- (c) Most candidates described weather satisfactorily as atmospheric condition at a place over a short time. They however, found it difficult to compare weather with seasons. Difference between the two phenomenon in time duration was stated by most candidates.

Other differences they failed to state was that the weather is caused by atmospheric condition, it covers a relatively small area, and it is measurable. Whilst season is caused by earth's revolution, it covers a large area, and it is immeasurable.

- (d) Most candidates indicated, correctly that a fertile soil contains all the essential nutrients, but failed to add that such soil supports successful plant growth. Most candidates identified only erosion, over grazing and leaching as causes for loss of soil fertility. Many other causes not mentioned include, nutrient mining, sand winning, mining, overcropping, excessive burning / bush fire, inefficient soil management practices etc.

Question 5

- (a) (i) **What is a magnetic field?**
(ii) **Name two methods of making magnets.**
- (b) **Explain briefly the term teenage pregnancy.**
- (c) **Write the formula for each of the following compounds:**
(i) **calcium chloride;**
(ii) **copper (I) oxide;**
(iii) **nitrogen (IV) oxide;**
(iv) **ammonia.**
- (d) (i) **List three physical properties of soil.**
(ii) **What is the texture of clayey soil?**

- (a) While most candidates described magnetic field as an area around a magnet where magnet force is felt, few of them described it as magnetic poles, namely north and south poles.
The methods were correctly named as induction, stroking, hammering and using electricity.
- (b) The term was satisfactorily explained by most candidates to include period covered by “teenage”, and sex of a person involved i.e. a girl, below age 20.
- (c) Most candidates failed to give correct formulae for the compounds, except calcium chloride.
- (d) “Soil has volume”, “soil has a fixed shape”, “soil promotes plant growth” are some of physical properties of soil listed by some candidates. Most candidates however listed correctly texture, colour and water content. Other properties not listed include structure, consistency, porosity, drainage, capillarity, air content etc.

Smooth/ sticky as texture of clayey soil was scored by most candidates.

Question 6

- (a) (i) **What are derived quantities?**
(ii) **State the S.I. units of the following quantities:**
(α) **area;**
(β) **volume.**
- (b) (i) **State two factors necessary for photosynthesis.**
(ii) **Explain the functions of each of the factors stated in (i).**
- (c) **Explain each of the following terms:**
(i) **soft water;**
(ii) **hard water.**
- (d) **State three reasons why some seeds are nursed.**

(a) (i) Most candidates had no idea what “derived quantities” are. Some described the term as “made from various physical quantities”, measuring tools used to monitor weather”. Only a few candidates correctly described the term as “combination of base/fundamental quantities”.

(ii) Again, only a few candidates stated the correct units for area and volume.

(b) (i) Most candidates knew the factors, and listed sunlight and chlorophyll. Wrong spelling of chlorophyll denied some candidates the mark. Carbon dioxide and water were hardly listed.

(ii) Functions of the factors were poorly described.

Chlorophyll	-	absorbs / traps light
Sunlight	-	is to provide energy
Water	-	combines with CO ₂ to produce food
Carbon dioxide	-	raw material / used in splitting water

(c) Most candidates explained the term satisfactorily except that a few of them could not spell the words lather and soap correctly.

(d) The question appeared difficult for most candidates as many of them made wild guesses such as:

“to make it easier to plant”, “to grow faster”

“to get good soil”, “to avoid over-crowding”

“to get water” etc.

Reasons for nursing seeds include the following:

1. Avoids adverse weather conditions
2. Provides favourable growth conditions (for tiny seeds)
3. Provides protection / care
4. Enables selection of healthy seedlings
5. Stimulates germination
6. Provides growth uniformly
7. Controls weeds, etc.