Aga Khan University Examination Board

Notes from E-Marking Centre on SSC-II Chemistry Annual Examinations 2023

Introduction

This document has been produced for the teachers and candidates of Secondary School Certificate (SSC) Part II Chemistry. It contains comments on candidates' responses to the 2023 SSC-II Examination indicating the quality of the responses and highlighting their relative strengths and weaknesses.

E-Marking Notes

This includes overall comments on candidates' performance on every question and *some* specific examples of candidates' responses that support the mentioned comments. Please note that the descriptive comments represent an overall perception of the better and weaker responses as gathered from the e-marking session. However, the candidates' responses shared in this document represent some specific example(s) of the mentioned comments.

Teachers and candidates should be aware that examiners may ask questions that address the Student Learning Outcomes (SLOs) in a manner that requires candidates to respond by integrating knowledge, understanding and application skills they have developed during the course of study. Candidates are advised to read and comprehend each question carefully before writing the response to fulfill the demand of the question.

Candidates need to be aware that the marks allocated to the questions are related to the answer space provided on the examination paper as a guide to the length of the required response. A longer response will not in itself lead to higher marks. Candidates need to be familiar with the command words in the SLOs which contain terms commonly used in examination questions. However, candidates should also be aware that not all questions will start with or contain one of the command words. Words such as 'how', 'why' or 'what' may also be used.

General Observations

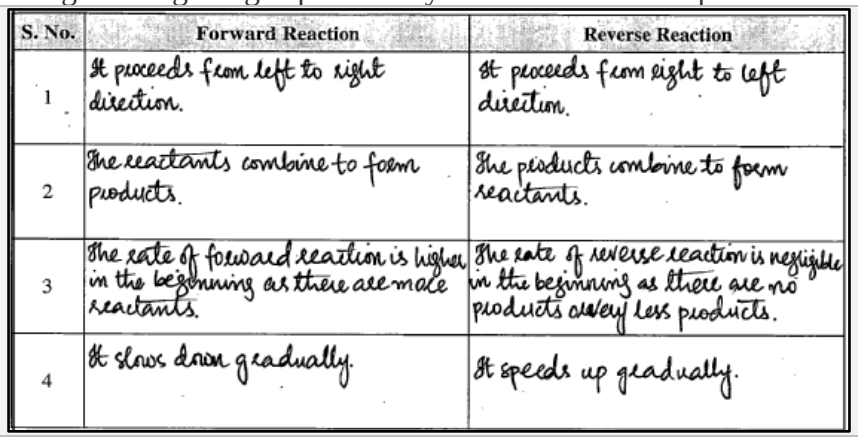
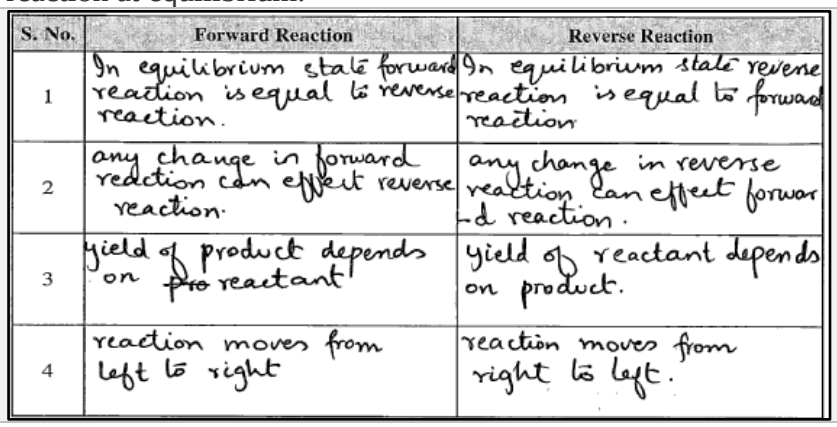
Most candidates achieved success in constructing good responses. Especially in the concepts of macroscopic properties of a reversible reaction and differentiation between oil and fats. Most of the candidates also outperformed when they were asked to recommend strategies that the governments adopt to control air pollution. Nonetheless, it is essential for teachers to concentrate on the following content and provide candidates with more drills and practice to foster a solid understanding.

- A clear division between the designated sections to address each area in CRQs as ERQs should be maintained.
- Illustrate alkyl radicals clearly showing either by removal of hydrogen or the position of vacant carbon.
- Recognise the importance of changes in water properties like colour, temperature, taste, and pH due to chemical contamination.
- Understand the fundamental properties of salts, including their ionic nature, crystalline structure, and physical characteristics.
- Calculations related to percentage, mole ratio, molecular mass, simplest ratio, and empirical formula along with mass and number.
- Stepwise, various methods of balancing equations of different chemical reactions.
- Identification and formation of ionic and covalent bonds.

Note: Candidates' responses shown in this report have not been corrected for grammar, spelling, format, or information.

DETAILED COMMENTS

Constructed Response Questions (CRQs)

Question No. 1	
Question Text	Mention FOUR macroscopic properties of a reversible reaction with reference to both forward and reverse reactions.
SLO No.	9.1.4
SLO Text	Describe the macroscopic characteristics of: a. forward and reverse reactions b. dynamic equilibrium.
Max Marks	4
Cognitive Level	K*
Checking Hints	1 mark for each macroscopic property
Overall Performance	The overall success rate of this question indicates candidates possess a strong understanding of the macroscopic properties of reversible reactions involving both forward and reverse reactions. However, some candidates revealed confusion between reversible and reverse reactions and inaccurately linked factors affecting the rate of reversible reaction to both forward and reverse reactions.
Description of Better Responses	Better responses showed a good grip over the macroscopic properties of reversible reactions. They correctly distinguished between forward and reverse reactions by highlighting the direction of the reaction, conversion of reactant to product and vice versa, along with a good grasp on the dynamics of reaction speed.
Image of Better Response	
Description of Weaker Responses	Weaker responses were unable to identify the keywords of the question. They represented confusion between reversible reactions and reverse reactions. Moreover, they linked the concept of forward and reverse reaction with factors affecting the rate of reversible reaction by focusing on the effect of change in temperature, pressure and catalyst on reversible reaction at equilibrium.
Image of Weaker Response	

S. No.	Forward Reaction	Reverse Reaction
1	It proceeds from left to right direction.	It proceeds from right to left direction.
2	The reactants combine to form products.	The products combine to form reactants.
3	The rate of forward reaction is higher in the beginning as there are more reactants.	The rate of reverse reaction is negligible in the beginning as there are no products or very less products.
4	It slows down gradually.	It speeds up gradually.

S. No.	Forward Reaction	Reverse Reaction
1	In equilibrium state forward reaction is equal to reverse reaction.	In equilibrium state reverse reaction is equal to forward reaction
2	any change in forward reaction can effect reverse reaction.	any change in reverse reaction can effect forward reaction.
3	yield of product depends on ~~pro~~ reactant	yield of reactant depends on product.
4	reaction moves from left to right	reaction moves from right to left.

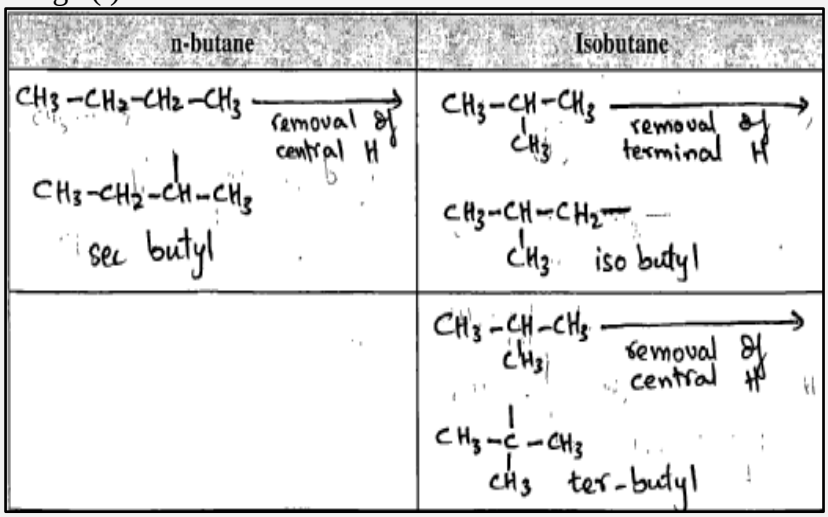
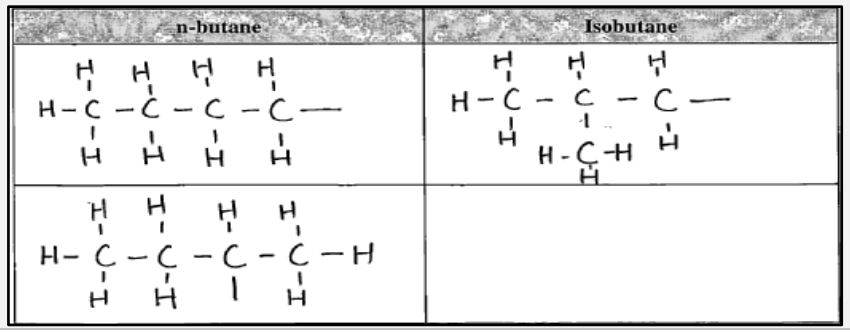
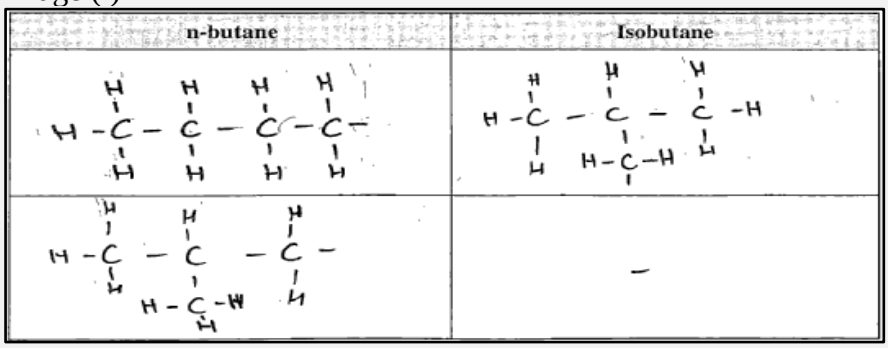
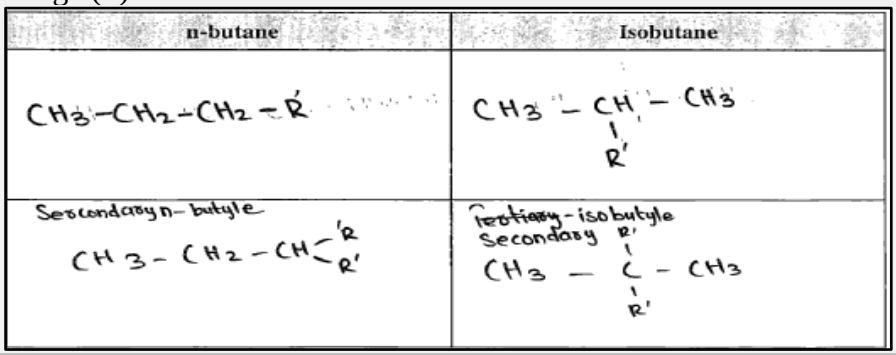
Suggestions for improvement (Highlight all that apply)

How to Approach SLO	Pedagogy** Used for that SLO	Assessment Strategies
• Understand the expectations of the command words • Look at the cognitive level • Identify the content that is required to answer that question (both in terms of understanding of concepts and any skills that may be required like analyzing or evaluating) • Go through the past paper questions on that particular concept • Refer to the resource guide for extra resources	• Story Board • Cause and Effect • Fish and Bone • Concept Mapping • Audio Visual Resources • Think, Pair and Share • Knowledge Platform videos • Questioning Technique (Socratic approach) • Practical Demonstration ** For description of each Pedagogy, refer to Annexure A	• Past paper questions • Discussion on E-Marking Notes • AKU-EB Digital Learning Solution powered by Knowledge Platform https://akueb.knowledgeplatform.com/login

Any Additional Suggestion: Teachers should make candidates read the question carefully to understand the demand of the question by focusing on the command words and to comprehend the concept asked. To improve candidates' performance teachers should focus on accurately identifying key terms, distinguishing between different reaction types, and gaining a thorough understanding of factors influencing reaction rates.

*K = Knowledge U = Understanding A = Application and other higher-order cognitive skills

Question No. 2	
Question Text	Draw the structures of any THREE possible alkyl radicals that can be formed using the given chain isomers. • n-butane • isobutane **n-butane** | **Isobutane** | | | |
SLO No.	11.3.2
SLO Text	Illustrate the formation of alkyl groups by the removal of hydrogen atom from their corresponding alkanes (up to five carbon atoms).
Max Marks	3
Cognitive Level	A
Checking Hints	1 mark for drawing the structure of each alkyl radical (any 3 required)
Overall Performance	Overall, candidates showed better performance in this question by clearly illustrating all the possible alkyl radicals. However, a few candidates struggled while showing the removal of hydrogen.
Description of Better Responses	Better responses illustrated the alkyl radicals with the removal of pertinent hydrogen connected to the structure. They represented the clear concept of drawing alkyl radicals mentioning/ depicting the terminal/ central hydrogen that is removed.

Images of Better Responses	Image (i)  Image (ii) 
Description of Weaker Responses	Weaker responses were unable to illustrate all possible radicals. They had a misconception in identifying the hydrogen to be removed, which represented the removal of terminal hydrogen as two different radicals although they were the same structures. Some candidates represented propyl radicals instead of butyl. Additionally, instead of representing the vacant carbon position as a radical, they mistakenly substituted a side chain/ alkyl radical (-R) for the removed hydrogen.
Images of Weaker Responses	Image (i)  Image (ii) 

Suggestions for improvement (Highlight all that apply)

How to Approach SLO	Pedagogy Used for that SLO	Assessment Strategies
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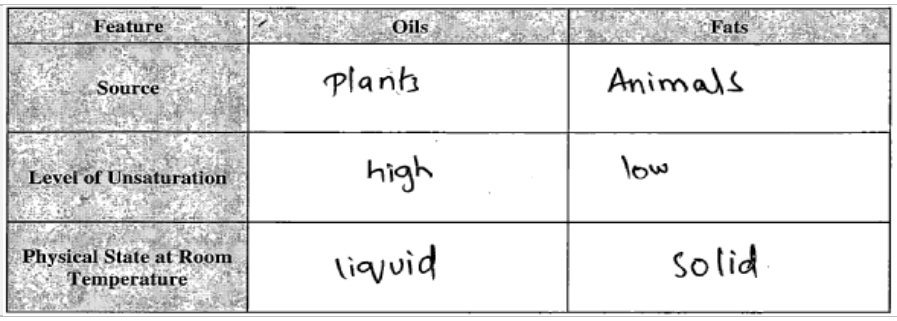
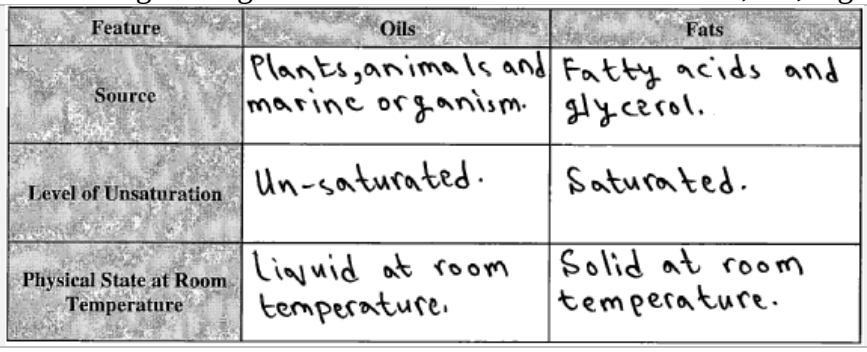
Any Additional Suggestion: Teachers are recommended to encourage candidates to critically assess their own illustrations, comparing them to the original molecule and considering the changes induced by hydrogen removal. To improve the responses candidates should understand the distinction between a radical and an alkyl substituent, ensuring that a free carbon vacancy is represented in radical form.

Question No. 3

Question Text	Differentiate between oils and fats on the basis of the given features. **Feature** / **Oils** / **Fats** **Source** **Level of Unsaturation** **Physical State at Room Temperature**
SLO No.	13.4.2
SLO Text	Differentiate between fats and oil.
Max Marks	3
Cognitive Level	U
Checking Hints	1 mark for each difference (3 required)
Overall Performance	A significant number of candidates demonstrated a competent grasp of key differentiators between oils and fats. However, most of the weak responses struggled to provide correct answers related to source and level of unsaturation.
Description of Better Responses	Better responses showed a good understanding of sources (oil from plants and fats from animal sources), level of unsaturation (high in oil and low in fats) and physical state at room temperature (oils are liquid and fats are solid).

Image of Better Response	 Feature / Oils / Fats Source: Plants / Animals Level of Unsaturation: high / low Physical State at Room Temperature: liquid / solid
Description of Weaker Responses	Weaker responses displayed candidates' misconceptions with reference to source and level of unsaturation. In the sources, they exhibited confusion between natural sources and reagents hence mentioned fatty acid and glycerol as sources of fats. Likewise, in the level of unsaturation, they inaccurately used the terms 'saturated' and 'unsaturated' instead of mentioning the degree of unsaturation in both oil and fats, i.e., high and low respectively.
Image of Weaker Response	 Feature / Oils / Fats Source: Plants, animals and marine organism. / Fatty acids and glycerol. Level of Unsaturation: Un-saturated. / Saturated. Physical State at Room Temperature: Liquid at room temperature. / Solid at room temperature.

Suggestions for improvement (Highlight all that apply)

How to Approach SLO	Pedagogy Used for that SLO	Assessment Strategies

• Understand the expectations of the command words
• Look at the cognitive level
• Identify the content that is required to answer that question (both in terms of understanding of concepts and any skills that may be required like analysing or evaluating)
  ◦ Go through the past paper questions on that particular concept
  ◦ Refer to the resource guide for extra resources
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Any Additional Suggestion: Teachers are highly recommended to emphasise the terminology, i.e., level of unsaturation, to meet the requirement of the question and prevent potential misinterpretations in their responses. Teachers can make their students get benefit from creating diagrams or charts that visually depict the differences between oils and fats based on their properties.

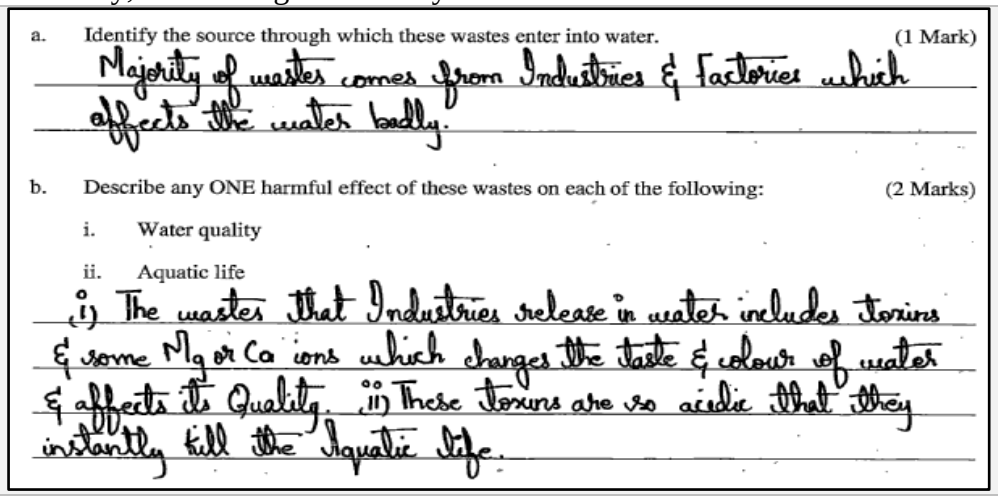
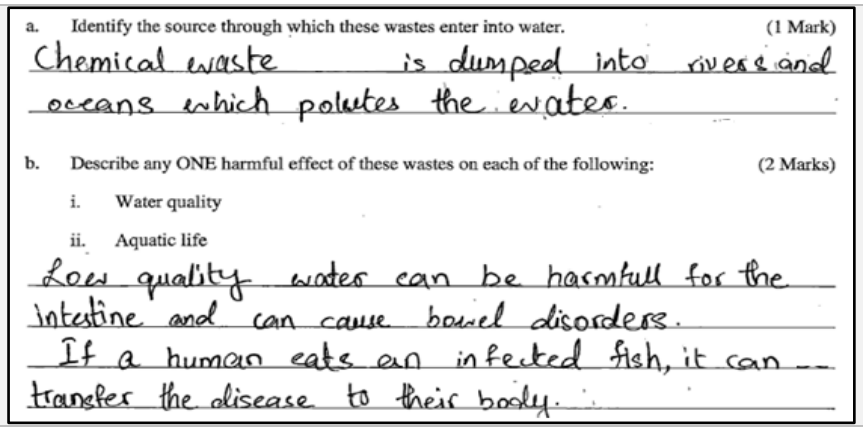
Question No. 4	
Question Text	Chemical wastes are one of the causes of water pollution. a. Identify the source through which these wastes enter into water. b. Describe any ONE harmful effect of these wastes on each of the following: i. Water quality ii. Aquatic life
SLO No.	15.4.2
SLO Text	Describe the effects of agricultural, industrial and household wastes on life.
Max Marks	3
Cognitive Level	U
Checking Hints	a. 1 mark for writing the source of chemical wastes b. 1 mark for writing each effect of chemical wastes on water quality 1 mark for writing each effect of chemical wastes on aquatic life
Overall Performance	The overall performance of candidates in these questions (a and b) was moderate. Most candidates successfully identified the source of chemical waste in water bodies. However, in part 'b', a significant number of candidates struggled to effectively describe the harmful effects of waste on water quality and aquatic life.
Description of Better Responses	Better responses in part 'a', correctly identified the sources that contribute to adding chemical wastes into the water like industrial effluents, agricultural effluents, and domestic effluents (sewage, non-biodegradable detergents, and plastic waste). In part 'b' they clearly described the harmful effects of chemical wastes on the quality of water. This includes changes in colour, temperature, appearance, taste, pH, smell (odour) and elevated amount of minerals in the water. Additionally, they also highlighted the toxicity of these chemicals to various forms of aquatic life, impeding their growth, causing infertility, or resulting in mortality.
Image of Better Response	 a. Identify the source through which these wastes enter into water. (1 Mark) Majority of wastes comes from Industries & Factories which affects the water badly. b. Describe any ONE harmful effect of these wastes on each of the following: (2 Marks) i. Water quality ii. Aquatic life (i) The wastes that Industries release in water includes toxins & some Mg or Ca ions which changes the taste & colour of water & affects its Quality. (ii) These toxins are so acidic that they instantly kill the Aquatic life.
Description of Weaker Responses	Weaker responses demonstrated shallow knowledge of the harmful effects of chemical waste on the quality of water. Most of these responses deviated towards the water-borne diseases that are caused by using contaminated water, rather than alterations in water quality due to contamination.

Image of Weaker Response	 a. Identify the source through which these wastes enter into water. (1 Mark) Chemical waste is dumped into rivers and oceans which polutes the waters. b. Describe any ONE harmful effect of these wastes on each of the following: (2 Marks) i. Water quality ii. Aquatic life Low quality water can be harmfull for the intestine and can cause bowel disorders. If a human eats an infected fish, it can transfer the disease to their body.

Suggestions for improvement (Highlight all that apply)

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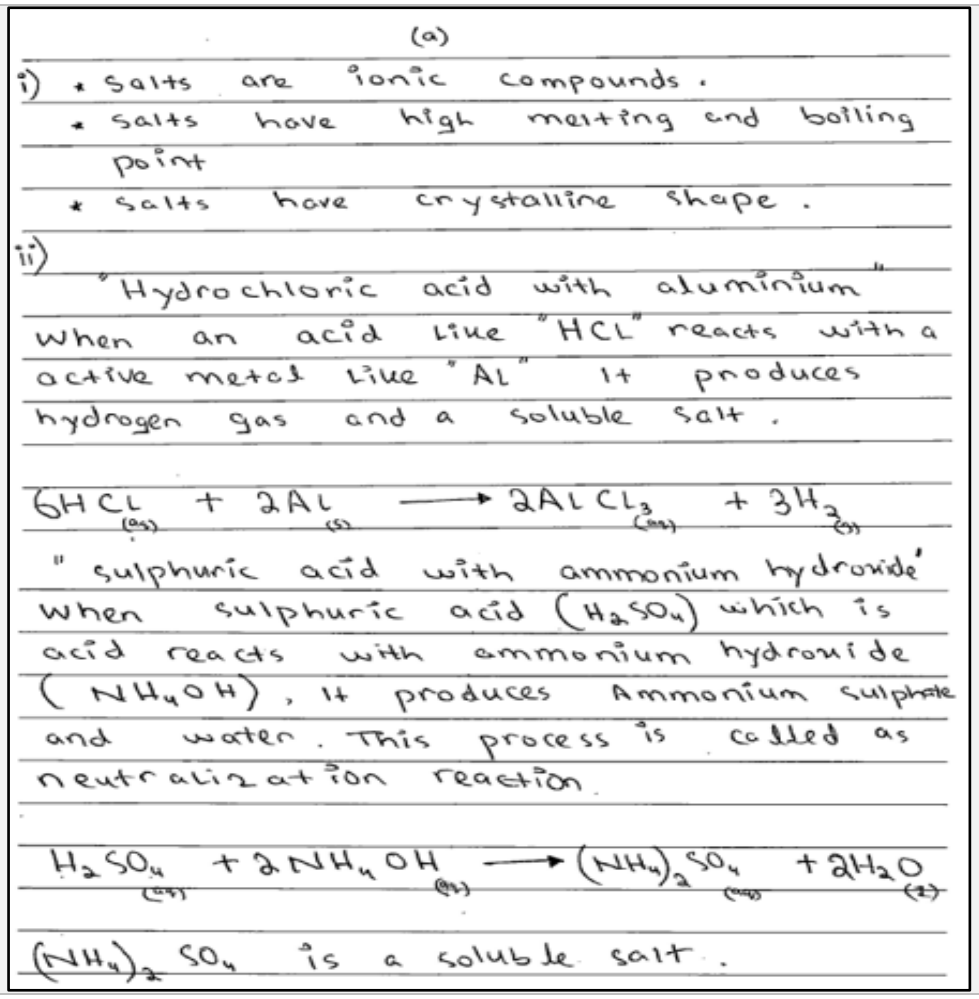
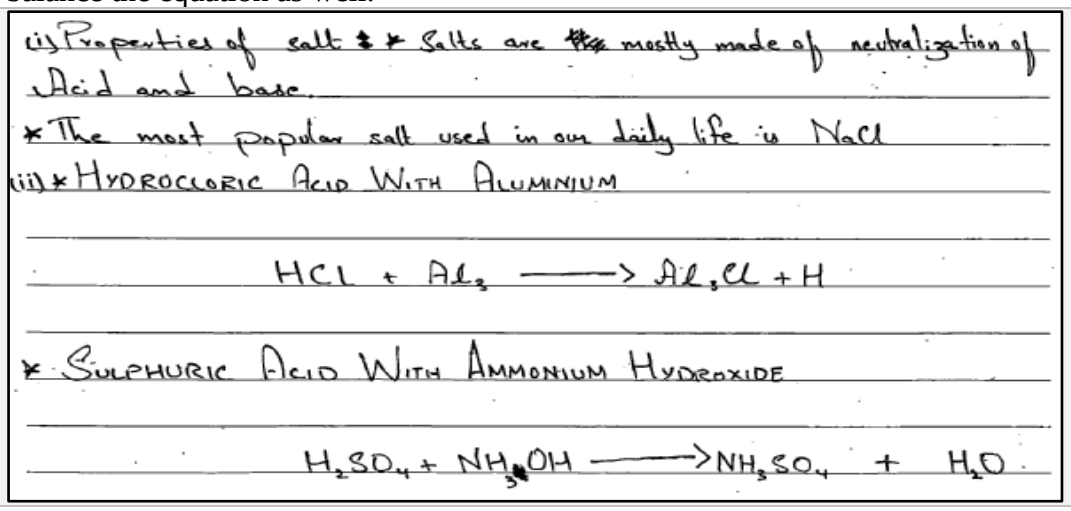
Any Additional Suggestion: It is highly recommended that teachers instil in their students the habit of carefully reading and comprehending the entire question. They should ensure that students' responses are aligned with the specific question prompt, focusing on the changes in water properties rather than waterborne diseases. To improve the latter part of the question, teachers should address the topic holistically by considering both the immediate physical changes in water quality and the subsequent effects on ecosystems and human communities.

Extended Response Questions (ERQs)

Extended response questions offered a choice between parts 'a' and 'b'

Question No. 5a	
Question Text	i. Write any TWO characteristic properties of salts. ii. With the help of a balanced chemical equation, show the preparation of soluble salts by reacting • hydrochloric acid with aluminium. • sulphuric acid with ammonium hydroxide.
SLO No.	10.7.2 (10.7.3)
SLO Text	Describe the properties of salts. (Describe the methods of preparing soluble and insoluble salts.)
Max Marks	6
Cognitive Level	U
Checking Hints	1 mark for each characteristic property of salt (2 required) 2 marks for the reaction of hydrochloric acid with aluminium - 1 mark for chemical equation - 1 mark for balancing 2 marks for the reaction of sulphuric acid with ammonium hydroxide - 1 mark for chemical equation - 1 mark for balancing
Overall Performance	Overall, most of the candidates showcased a solid grasp of the characteristic properties of salts. However, most of the candidates faced challenges in balancing equations accurately.
Description of Better Responses	Better responses represented a good understanding of the characteristic properties of salts such as salts are ionic compounds found in crystalline solids form and have high melting and boiling points. Similarly, these responses successfully portrayed the preparation of soluble salts by showing the balanced chemical equations with the correct formula as follows: The reaction of hydrochloric acid with aluminium $2Al_{(s)} + 6HCl_{(aq)} \rightarrow 2AlCl_{3(aq)}) + 3H_{2(g)}$ The Reaction of sulphuric acid with ammonium hydroxide $2NH_4OH_{(aq)} + H_2SO_{4(aq)}) \rightarrow (NH_4)2SO_{4(aq)} + 2H_2O_{(l)}$

Image of Better Response	
Description of Weaker Responses	Weaker responses in part 'i', showed a lack of content knowledge regarding specific characteristics of salts. These responses provided irrelevant answers such as highlighting the formation of salt by acid-base neutralisation and mentioning the uses of salt. Likewise, they exhibited a lack of clarity regarding the formula writing and concept of valancies. They erroneously represented ammonium ions as ammonia and were unable to balance the equation as well.
Image of Weaker Response	

(a)

i) * Salts are ionic compounds.
* Salts have high melting and boiling point
* Salts have crystalline shape.

ii)

"Hydrochloric acid with aluminium"

When an acid like "HCL" reacts with a active metal like "Al" it produces hydrogen gas and a soluble salt.

$6HCl_{(aq)} + 2Al_{(s)} \longrightarrow 2AlCl_{3(aq)} + 3H_{2(g)}$

"sulphuric acid with ammonium hydroxide'

When sulphuric acid (H_2SO_4) which is acid reacts with ammonium hydroxide (NH_4OH), it produces Ammonium sulphate and water. This process is called as neutralization reaction

$H_2SO_{4(aq)} + 2NH_4OH_{(aq)} \longrightarrow (NH_4)_2SO_{4(aq)} + 2H_2O_{(l)}$

$(NH_4)_2SO_4$ is a soluble salt.

(i) Properties of salt * Salts are ~~the~~ mostly made of neutralization of Acid and base.

* The most popular salt used in our daily life is NaCl

(ii) * HYDROCLORIC ACID WITH ALUMINIUM

$HCl + Al_3 \longrightarrow Al_3Cl + H$

* SULPHURIC ACID WITH AMMONIUM HYDROXIDE

$H_2SO_4 + NH_3OH \longrightarrow NH_3SO_4 + H_2O$

Suggestions for improvement (Highlight all that apply)

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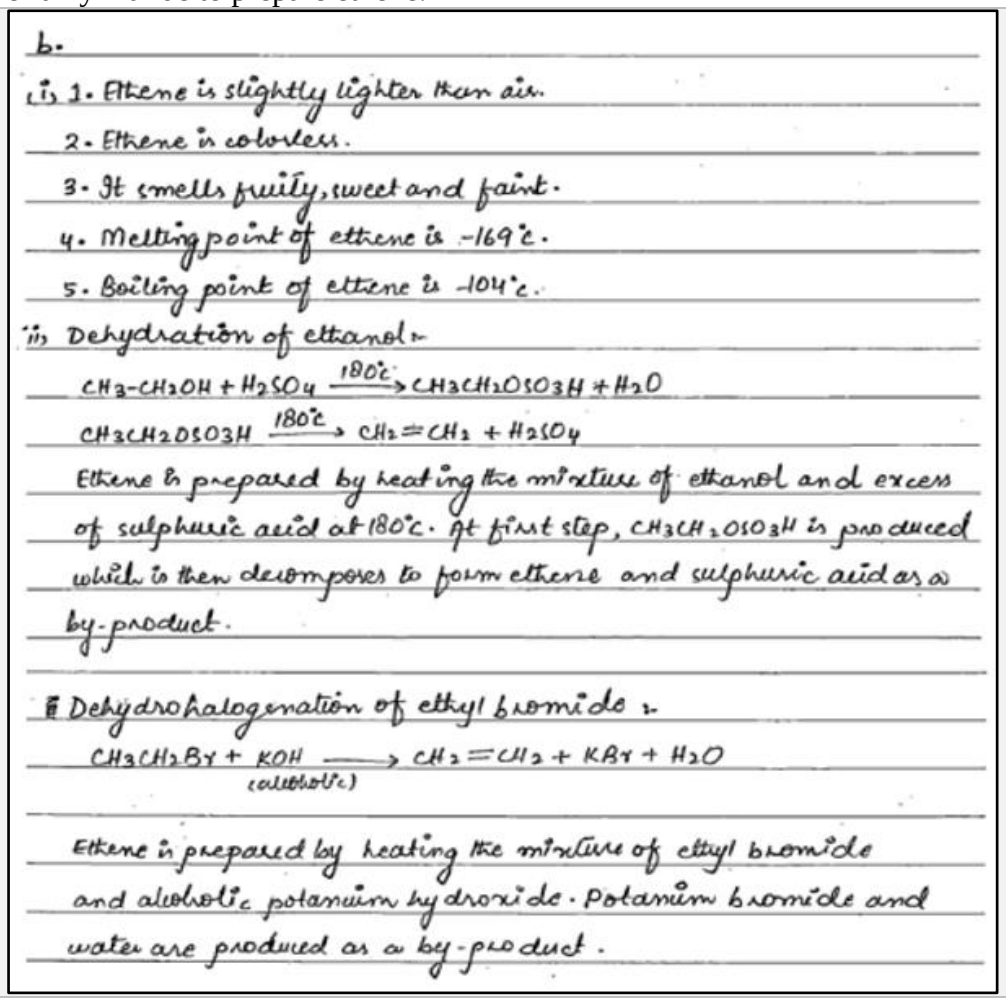
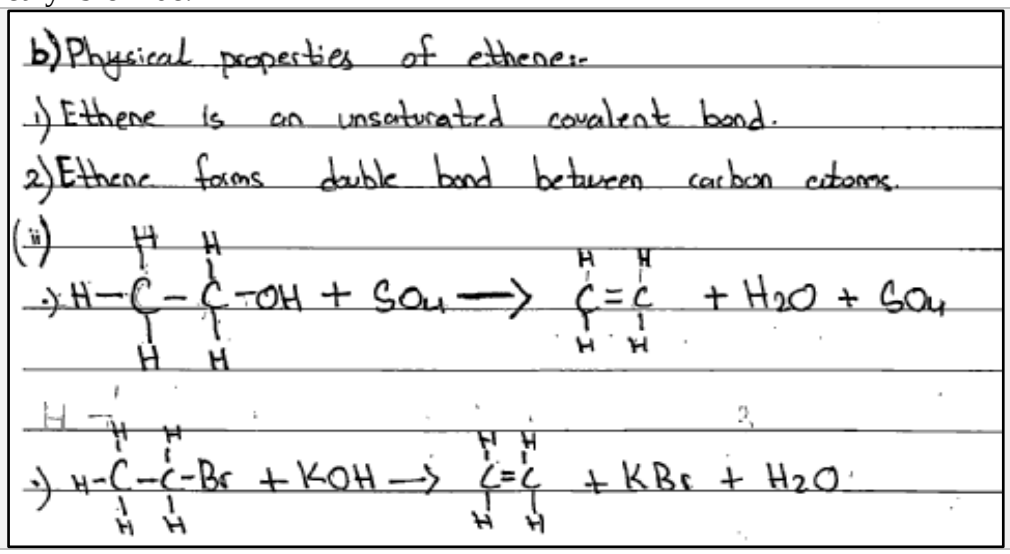
Any Additional Suggestion: It is recommended that teachers provide practice materials for accurately writing chemical formulas to help candidates become familiar with the concept of valency. This will help avoid confusion and errors in their responses. It is also suggested that when providing chemical equations, teachers should ensure that they are appropriate and accurately represent the preparation of the specified compounds. To improve performance, teachers should encourage students to comprehend the question, hone their formula-writing skills, and understand the core properties and preparation methods of salts.

Question No. 5b	
Question Text	i. Write any TWO physical properties of ethene. ii. Write chemical equations to show the preparation of ethene by the following methods. • Dehydration of ethanol using an excess of sulphuric acid • Dehydrohalogenation of ethyl bromide with alcoholic potassium hydroxide (**Note**: Mention conditions where essential for the reaction to occur.)
SLO No.	12.6.2 (12.6.3)
SLO Text	Describe the physical properties of ethene (ethylene), (Show the preparation of alkenes from dehydration of alcohols and dehydrohalogenation of alkyl halides using chemical equations)
Max Marks	6
Cognitive Level	U
Checking Hints	1 mark for each correct property (any 2 required) 2 marks for each correct chemical equation (2 required)
Overall Performance	The overall performance of candidates in part 'i' was up to the mark, demonstrating a clear understanding of ethane's physical properties. However, in part 'ii', most of the candidates encountered challenges while providing the correct balanced equation for dehydrohalogenation of the alkyl halide to ethene.

Description of Better Responses	Better responses in part 'i' showed a sound understanding of the physical properties of ethane. They correctly mentioned that ethane is a colourless gas and possesses a faint sweet/ pleasant smell (odour). Furthermore, they have accurately written that ethane is insoluble in polar solvents like water but dissolves in organic solvent/ non-polar solvents such as alcohol and ether. In part 'ii', they represented the dehydration of alcohol with the correct catalyst H_2SO_4 at 180°C along with the correct balanced equation of dehydrohalogenation of alkyl halide to prepare ethene.
Image of Better Response	
Description of Weaker Responses	In part 'i', weaker responses presented the molecular structure or uses of ethene instead of writing about the physical properties. Similarly, in part 'ii', they were unable to represent HCl as a catalyst and did not mention the condition of heat. Furthermore, some candidates represented ethyl chloride instead of ethyl bromide.
Image of Weaker Response	

Suggestions for improvement (Highlight all that apply)

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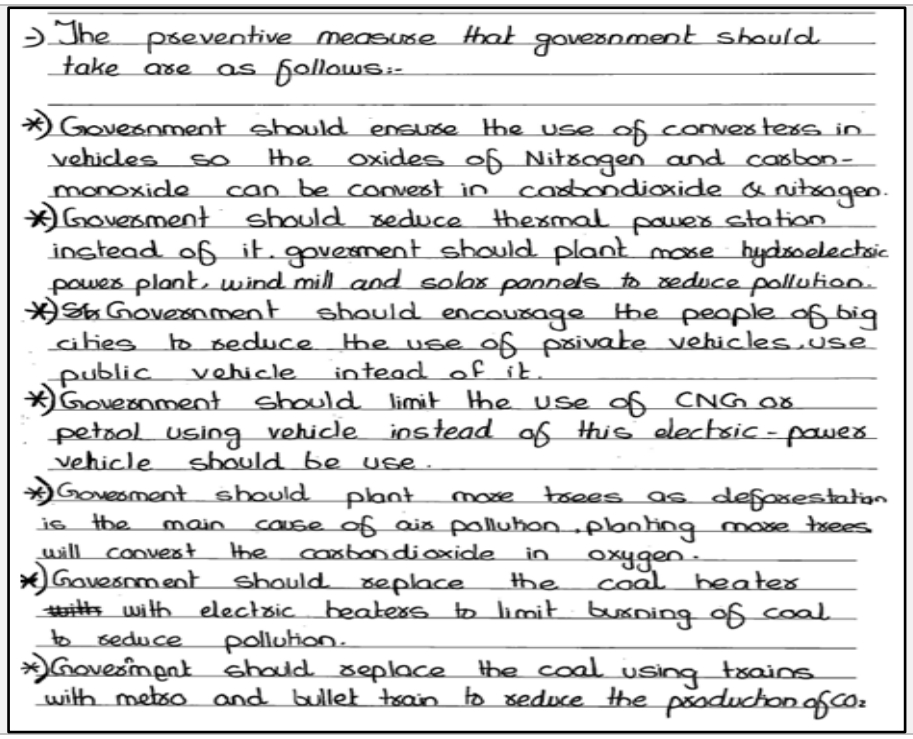
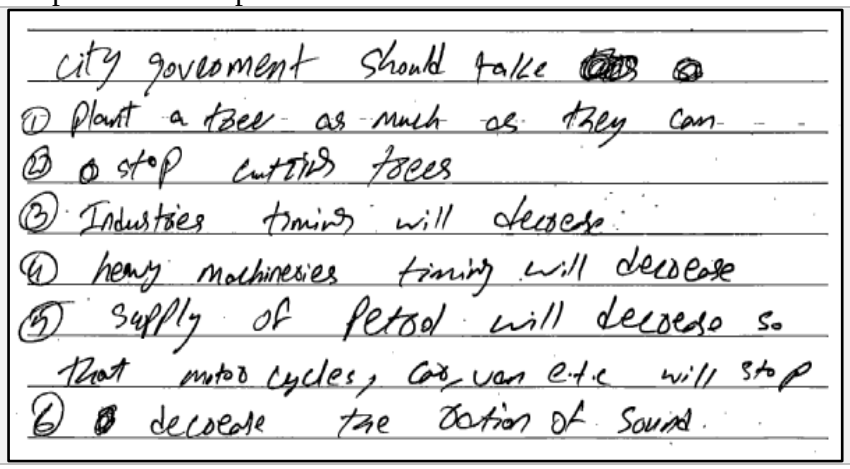
Any Additional Suggestion: To provide a comprehensive answer, teachers are advised to emphasise the importance of specifying all necessary reaction conditions, such as catalysts and temperature. Utilising examples of various compounds and reactions can help to solidify candidates' understanding and application of the concepts.

Question No. 6a	
Question Text	An air quality index (AQI) of a city report that the level of greenhouse gases and particulate matter is alarming. Suggest any SIX measures that the city government should take to combat the given situation.
SLO No.	14.3.4
SLO Text	Recommend strategies that the governments adopt to control air pollution;
Max Marks	6
Cognitive Level	U
Checking Hints	1 mark for each correct suggestion (Any 6 required) Any other relevant suggestion will be awarded marks
Overall Performance	The overall performance of candidates in this question was well responded to as many of the candidates displayed a comprehensive understanding of effective strategies to address air pollution. Moreover, they showcased a problem-solving approach aligned with government initiatives.
Description of Better Responses	Better responses in part 'a' suggested government to promote the use of public transport, restrict deforestation and promote afforestation, promote biogas industries and environmentally friendly fuel, use catalytic converters in automobiles, ensure proper solid waste management instead of incineration, use of biodegradable resources, promote the use of solar/ wind energy/ any other renewable resources and promote recycling of waste and much more relevant point.

Image of Better Response	
Description of Weaker Responses	Weak responses responded with limitation or restriction of sources of air pollution like the industrial sector should work for fewer hours or we should close the factories, there should be no use of petrol etc. They were unable to mention the suitable strategies that governments adopt to meet the problem.
Image of Weaker Response	

Suggestions for improvement (Highlight all that apply)

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• Go through the past paper questions on that particular concept • Refer to the resource guide for extra resources	• Practical Demonstration	

Any Additional Suggestion: Teachers are recommended that during classroom teaching and learning to encourage candidates to back up their suggestions with relevant examples to demonstrate the feasibility and effectiveness of their proposed strategies.

Question No. 6b	
Question Text	Explain the negative effect of excessive use of fertilisers on the following components of the environment. i. Water bodies ii. Human health iii. Climate across the globe
SLO No.	16.5.4
SLO Text	Discuss advantages and disadvantages of using synthetic fertilisers versus natural fertilisers.
Max Marks	6
Cognitive Level	U
Checking Hints	2 marks for the effects on each component (3 required) Award 1 mark for writing information related to each component, i.e., 2 points for each component
Overall Performance	Overall, moderate performance by the candidates was observed, however, candidates need more concentration on this topic and must broaden their knowledge of the pros and cons of fertilisers.
Description of Better Responses	Better responses showed a proper understanding of the demand of the question as they accurately covered all their required areas (water bodies, human health, and climate across the globe) being affected by excessive use of fertilisers. Regarding water bodies, candidates mentioned the increasing growth of algae and decreasing levels of oxygen, leading to a toxic environment, and ultimately causing the death of aquatic creatures. Referring to human health, they provided an explanation about the potential hazards of using contaminated water/ food, which can cause chronic diseases, especially in children Furthermore, they highlighted the risks of respiratory and skin problems and pointed out the potential for the development of cancer. In climate across the globe, they focused on the production of greenhouse gases leading to global warming and weather changes. They also mentioned the by-products of nitrogen and their contribution towards acid rain.
Images of Better Responses	Image (i)

(b) (i) Water Bodies:-

① Run offs from the soils and rocks of agricultural fields contains heavy metals (Al, Hg, Pb etc). The aluminium ion blocks the gills of the fishes which causes their death.

② The elements used in the fertilizers cause a rapid growth of algae in water. When the algae decomposes, it absorbs a large quantity of oxygen due to which the quantity of oxygen in water decreases and animals face difficulties.

③ The heavy metals form a layer on the surface of water which blocks the passage of sunlight to the water which harms the animals in it.

(ii) Human health:-

① When humans will drink the water from the river which contains run off water from agricultural fields, so they can get various diseases like cholera, typhoid etc.

② The quality of food obtained by using fertilizers in the crops will be much worse that naturally grown crops.

③ Excessive use of fertilizers on crops will damage the crops and will reduce the natural nutrients, vitamins present in it.

(iii) Climate across the globe:-

① Fertilizers contains large amount of harmfull gases which leads to green house effect and global warming.

② Excessive use of fertilizers cause crops to die which will result in droughts, floods etc.

Image (ii)

(i) water bodies:-

when excess amount of fertilizer enters water it :-

(1) contaminates water which is no longer drinkable

(2) harm aquatic life by increasing the chemical concentration when aquatic animals drink that water, the high toxin level causes them to die.

(ii) human health:-

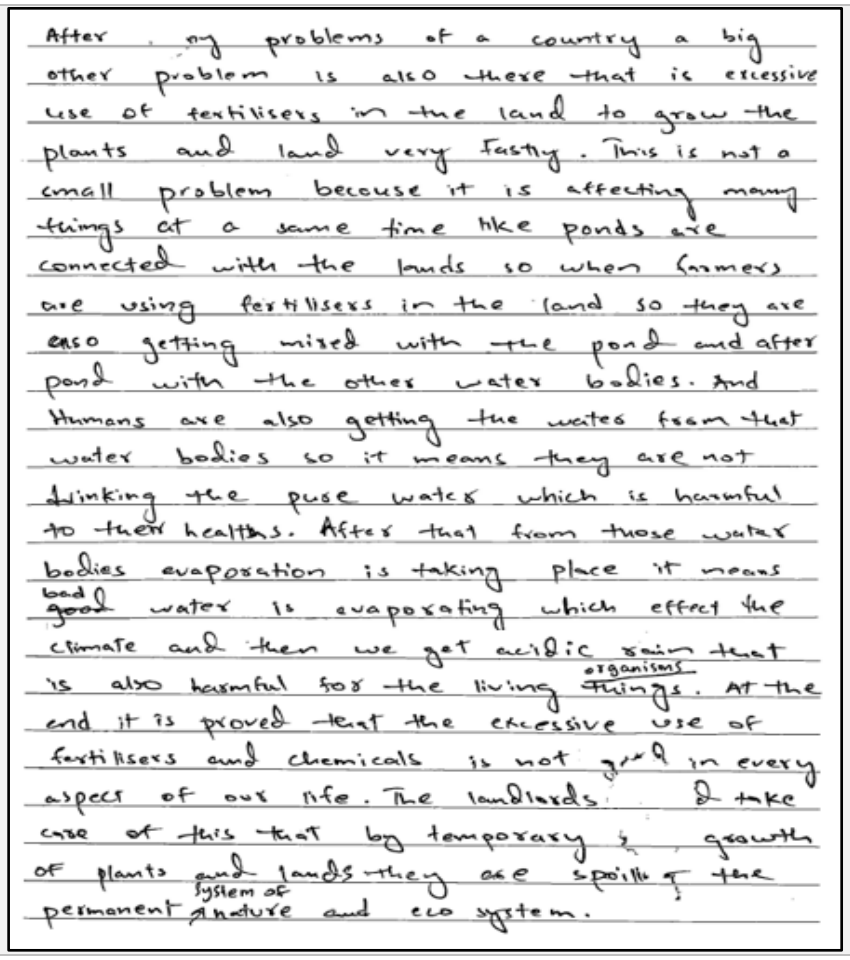
(1) when we inhale these highly concentrated chemicals it causes excessive coughing and respiratory deseases.

(2) when those fertilizers enter our food it causes intestinal problems.

(iii) climate across the globe:-

(1) the fertilizers such as Nitrogen and sulphur release into the atmosphere and combine with oxygen molecules forming pollutants. Those pollutants then dissolve with rain water & form acid rain which is harmful for life.

(2) The excess amount of Pollutants in atmosphere causes Pollution. This causes global warming & climate change.

Description of Weaker Responses	Weak responses displayed confusion regarding the negative effects of fertilisers within the specified environmental components. Their answers exhibited an unclear segmentation of the question's three required areas: water bodies, human health, and global climate. Consequently, they jumbled up these areas and struggled to adequately describe any of them. They wrote general responses like water will get contaminated instead of focusing on key points that will be the reason for contamination like the deposition of toxic chemicals for a long time and its effect on survival needs of water bodies. They were unable to identify the proper effect of excessive use of fertilisers on human health and on climate across the globe as well.
Image of Weaker Response	

After any problems of a country a big other problem is also there that is excessive use of fertilisers in the land to grow the plants and land very fastly. This is not a small problem because it is affecting many things at a same time like ponds are connected with the lands so when farmers are using fertilisers in the land so they are also getting mixed with the pond and after pond with the other water bodies. And Humans are also getting the waters from that water bodies so it means they are not drinking the pure water which is harmful to their healths. After that from those water bodies evaporation is taking place it means bad good water is evaporating which effect the climate and then we get acidic rain that is also harmful for the living organisms things. At the end it is proved that the excessive use of fertilisers and chemicals is not good in every aspect of our life. The landlords should take care of this that by temporary growth of plants and lands they are spoiling the system of permanent nature and eco system.

Suggestions for improvement (Highlight all that apply)

How to Approach SLO	Pedagogy Used for that SLO	Assessment Strategies
• Understand the expectations of the command words • Look at the cognitive level • Identify the content that is required to answer that question (both in terms of understanding of concepts and any skills that may be required like analysing or evaluating) • Go through the past paper questions on that particular concept	• Story Board • Cause and Effect • Fish and Bone • Concept Mapping • Audio Visual Resources • Think, Pair and Share • Knowledge Platform videos • Questioning Technique (Socratic approach)	• Past paper questions • Discussion on E-Marking Notes • AKU-EB Digital Learning Solution powered by Knowledge Platform https://akueb.knowledgeplatform.com/login

• Refer to the resource guide for extra resources	• Practical Demonstration ** For description of each pedagogy, refer to Annexure A	
Any Additional Suggestion: Teachers are advised to encourage candidates to focus on distinct points within each area, discussing precise effects, consequences, and mechanisms to showcase a deeper understanding. Teachers should make candidates consider the local and global context while discussing impacts, tailoring their responses to suit both regional and worldwide implications. Moreover, teachers should guide candidates to maintain a clear division between the designated sections to address each area which are water bodies, human health, and global climate, separately and comprehensively.		

Annexure A: Pedagogies Used for Teaching the SLOs

Pedagogy: Storyboard
Description: A visual pedagogy that uses a series of illustrated panels to present a narrative, encouraging creativity and critical thinking. It helps learners organise ideas, sequence events, and comprehend complex concepts through storytelling.
Example: In a Literature class, students are tasked with creating storyboards to visually retell a novel. They draw key scenes, write captions, and present their stories to the class, enhancing their reading comprehension and fostering their imagination.

Pedagogy: Cause and Effect
Description: This pedagogy explores the relationships between actions and consequences. By analysing cause-and-effect relationships, learners develop a deeper understanding of how events are interconnected and how one action can lead to various outcomes.
Example: In a History class, students study the causes and effects of the Industrial Revolution. They research and discuss how technological advancements in manufacturing led to significant societal changes, such as urbanisation and labour reform movements.

Pedagogy: Fish and Bone
Description: A method that breaks down complex topics into main ideas (the fish) and supporting details (the bones). This visual approach enhances comprehension by highlighting essential concepts and their relevant explanations.
Example: During a Biology class on human anatomy, the teacher uses the fish and bone technique to teach about the human skeletal system. Teacher presents the main components of the human skeleton (fish) and elaborates on each bone's structure and function (bones).

Pedagogy: Concept Mapping
Description: An effective way to visually represent relationships between ideas. Learners create diagrams connecting key concepts, aiding in understanding the overall structure of a subject and fostering retention.
Example: In a Psychology assignment, students use concept mapping to explore the various theories of personality. They interlink different theories, such as Freud's psychoanalysis, Jung's analytical psychology, and Bandura's social-cognitive theory, to see how they relate to each other.

Pedagogy: Audio Visual Resources
Description: Incorporating multimedia elements like videos, images, and audio into lessons. This approach caters to different learning styles, making educational content more engaging and memorable.
Example: In a General Science class, the teacher uses a documentary-style video to teach about the solar system. The video includes stunning visual animations of the planets, interviews with astronomers, and background music, enhancing students' interest and understanding of space.

Pedagogy: Think, Pair, and Share
Description: A collaborative learning technique where students ponder a question or problem individually, then discuss their thoughts in pairs or small groups before sharing with the entire class. It fosters active participation, communication skills, and diverse perspectives.
Example: In a Literature in English class, the teacher poses a thought-provoking question about a novel's moral dilemma. Students first reflect individually, then pair up to exchange their opinions, and finally participate in a lively class discussion to explore different viewpoints.

Pedagogy: Questioning Technique (Socratic Approach)
Description: Based on Socratic dialogue, this method stimulates critical thinking by posing thought-provoking questions. It encourages learners to explore ideas, justify their reasoning, and discover knowledge through a process of inquiry.
Example: In an Ethics class, the instructor uses the Socratic approach to lead a discussion on the meaning of justice. By asking a series of probing questions, the students engage in a deeper exploration of ethical principles and societal values.

Pedagogy: Practical Demonstration
Description: A hands-on approach where learners observe real-life applications of theories or skills. Practical demonstrations enhance comprehension, skill acquisition, and problem-solving abilities by bridging theoretical concepts with real-world scenarios.
Example: In a Food and Nutrition class, the instructor demonstrates the proper technique for filleting a fish. Students observe and then practice the skill themselves, learning the practical application of knife skills and culinary precision.

(**Note:** The examples provided in this annexure serve as illustrations of various pedagogies. It is important to understand that these pedagogies are versatile and can be applied across subjects in numerous ways. Feel free to adapt and explore these techniques creatively to enhance learning outcomes in your specific context.)

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