

**YEAR 2020 EXAMINATION**

**ISC**

# Analysis of Pupil Performance

## ENVIRONMENTAL SCIENCE



**Research Development and Consultancy Division**  
**Council for the Indian School Certificate Examinations**  
**New Delhi**

**Year 2020**

---

***Published by:***

Research Development and Consultancy Division (RDCD)

Council for the Indian School Certificate Examinations

Pragati House, 3<sup>rd</sup> Floor

47-48, Nehru Place

New Delhi-110019

Tel: (011) 26413820/26411706

E-mail: [council@cisce.org](mailto:council@cisce.org)

**© Copyright, Council for the Indian School Certificate Examinations**

All rights reserved. The copyright to this publication and any part thereof solely vests in the Council for the Indian School Certificate Examinations. This publication and no part thereof may be reproduced, transmitted, distributed or stored in any manner whatsoever, without the prior written approval of the Council for the Indian School Certificate Examinations.

## FOREWORD

This document of the Analysis of Pupils' Performance at the ISC Year 12 and ICSE Year 10 Examination is one of its kind. It has grown and evolved over the years to provide feedback to schools in terms of the strengths and weaknesses of the candidates in handling the examinations.

We commend the work of Mrs. Shilpi Gupta (Deputy Head) and the Research Development and Consultancy Division (RDCD) of the Council who have painstakingly prepared this analysis. We are grateful to the examiners who have contributed through their comments on the performance of the candidates under examination as well as for their suggestions to teachers and students for the effective transaction of the syllabus.

We hope the schools will find this document useful. We invite comments from schools on its utility and quality.

**November 2020**

**Gerry Arathoon  
Chief Executive & Secretary**

The CISCE has been involved in the preparation of the ICSE and ISC Analysis of Pupil Performance documents since the year 1994. Over these years, these documents have facilitated the teaching-learning process by providing subject/ paper wise feedback to teachers regarding performance of students at the ICSE and ISC Examinations. With the aim of ensuring wider accessibility to all stakeholders, from the year 2014, the ICSE and the ISC documents have been made available on the CISCE website [www.cisce.org](http://www.cisce.org).

The documents for the ICSE and ISC Examination Year 2020 include a detailed qualitative analysis of the performance of students in different subjects. The purpose of this analysis is to provide insights into how candidates have performed in individual questions set in the question paper. This section is based on inputs provided by examiners from examination centers across the country. It comprises of question wise feedback on the performance of candidates in the form of *Comments of Examiners* on the common errors made by candidates along with *Suggestions for Teachers* to rectify/ reduce these errors. The *Marking Scheme* for each question has also been provided to help teachers understand the criteria used for marking. Topics in the question paper that were generally found to be difficult or confusing by candidates, have also been listed down, along with general suggestions for candidates on how to prepare for the examination/ perform better in the examination.

The Analysis of Pupil Performance document for ICSE for the Examination Year 2020 covers the following subjects/papers: English (English Language, Literature in English), History and Civics, Mathematics, Physics, Chemistry, Commercial Studies and Environmental Science.

Subjects covered in the ISC Analysis of Pupil Performance document for the Year 2020 include English (English Language and Literature in English), Hindi, Physics, Chemistry, Mathematics, Computer Science, History, Political Science, Economics, Commerce, Accounts, and Environmental Science.

I would like to acknowledge the contribution of all the ICSE and the ISC examiners who have been an integral part of this exercise, whose valuable inputs have helped put this document together.

I would also like to thank the RDCD team of Dr. M.K. Gandhi, Dr. Manika Sharma, Mrs. Roshni George and Ms. Mansi Guleria, who have done a commendable job in preparing this document.

We hope that this document will enable teachers to guide their students more effectively and comprehensively so that students prepare for the ICSE/ ISC Examinations, with a better understanding of what is required from them.

November 2020

*Shilpi Gupta*  
Deputy Head - RDCD

# CONTENTS

	<b>Page No.</b>
<b><i>FOREWORD</i></b>	<b><i>i</i></b>
<b><i>PREFACE</i></b>	<b><i>ii</i></b>
<b>QUALITATIVE ANALYSIS: ENVIRONMENTAL SCIENCE</b>	<b>1</b>

# PART I (20 Marks)

*Answer all questions*

## Question 1

- (i) Define *deep ecology*. How is the concept of deep ecology different from shallow ecology? [2]
- (ii) Mention *any two* factors influencing the growth of population. [2]
- (iii) Give *any four* characteristics of 'r' strategy. [2]
- (iv) Give *any two* differences between a *national park* and a *sanctuary*. [2]
- (v) Differentiate between *primary pollutants* and *secondary pollutants*. Give *one* example each. [2]
- (vi) Give *any two* socio-economic benefits of cottage industries. [2]
- (vii) What is *food adulteration*? Name *two* of the common food adulterants. [2]
- (viii) Give the full forms of: [2]
- (a) MFN
- (b) EPR
- (ix) Classify the natural resources based on its distribution, giving examples. [2]
- (x) What is IPR? State *any two* categories of IPR. [2]

### Comments of Examiners

- (i) Most of the candidates wrote the answer correctly but some candidates muddled up shallow and deep ecology.
- (ii) Some candidates did not understand that the question was about any population and not particularly human population and hence they only wrote the points regarding the human population. Many candidates got confused between factors that influence the "population growth" and the factors that affect "birth rate". They wrote points such as, desire for a male child, marriageable age, religious beliefs, which are factors affecting birth rate and not population growth.
- (iii) Almost all the candidates attempted this question correctly except for a few, who wrote the features of "k" strategies. Some got confused between

### Suggestions for Teachers

- Explain the definition of both deep and shallow ecology by explaining the difference between the two.
- Emphasise writing the differences between deep and shallow ecology in columns.
- Discuss the factors influencing the growth of population in detail.
- Teach the concepts of 'r' and 'k' strategies with the help of a comparative table and ensure that students understand the basic difference between both. Use specific examples of organisms which show the respective characteristic features. Help students understand the features of

strategies and population growth curves or age pyramids.

- (iv) Some candidates wrote similar points for both *national park* and *sanctuary*. Operative words or the key words were not mentioned in the answers. Some candidates interchanged the main features of a national park and a sanctuary in their answers. Several candidates wrote examples of each as a differentiating feature.
- (v) Most candidates did not write the basic concept of primary and secondary pollutants and their examples correctly.
- (vi) Most candidates answered this question correctly. However, some who did not know the meaning of the word *socio-economic*, gave a number of benefits which were not necessarily socio economic in nature.
- (vii) Many candidates wrote about the concept of food preservation instead of food adulteration. Some wrote only the names of the adulterants and missed out on writing the food which was adulterated. For example: "Sugar syrup" was written as an example of common food adulterants, instead of writing "sugar syrup is added to honey " as an adulterant.
- (viii) Most of the candidates wrote the full form of MFN correctly but some wrote the full form of EPR as *Economic Property Right / Ecological Product Region*, etc. Many candidates did not begin each word of the full form with a capital letter.
- (ix) Many candidates did not classify natural resources based on *distribution* of resources. They wrote about all types of classification of resources like, biotic-abiotic, renewable-nonrenewable, etc. A few candidates wrote the correct answer, but the key words were missing.
- (x) Most of the candidates attempted this question correctly. However, a few candidates did not mention the categories of IPR.

*`r' strategies with the help of survivor-ship curve.*

- *Clarify that life strategies, growth curves and demographic transition are all different tools of population study. Teachers should give more examples while teaching both the strategies to avoid confusion between the two.*
- *Point out the basic difference between a National Park and a Sanctuary on the basis of the main function of the two in conservation of flora and fauna. The legal stand taken by the Centre and States also needs to be explained.*
- *Teach the concept of primary and secondary pollutants (with specific examples from our day to day life) in a tabular form, for clarity.*
- *Clarify the meaning of the term `socio-economic' and spell out the socio-economic benefits of cottage industries.*
- *Explain food adulteration and common food adulterants by giving examples from the daily life.*
- *Prepare a complete set of abbreviations from the given scope and make it available to students to learn/practice.*
- *Train students to read the question carefully and emphasise on the various parameters of classifying natural resources.*
- *Spell out the meaning of IPR and its categories.*
- *Give adequate practice to students in answering questions to the point as per the requirements of the question.*
- *Conduct oral and written tests in class frequently.*

## MARKING SCHEME

### Question 1

- (i) **Deep ecology:** Deep ecology is a modern ecological thought that recognizes the value of every living organism irrespective of its utility to man. Concept of deep ecology is different from shallow ecology because shallow ecology believes in conservation of the environment only for human need.

*(Any one definition)*

It believes in the balance of complex inter relationship in which the existence of organism is dependent on the existence of others within ecosystem whereas shallow ecology believes in conserving the forest for oxygen or timber or eco-tourism.

The living environment as a whole should be respected whereas in shallow ecology there is selfish motive behind all conservation action.

Deep ecologists believe that the world does not exist as a resource to be freely exploited by humans.

The shallow ecologists do wish to save the world but only for man's own need.

*(Any one explanation)*

- (ii) **Factors influencing the growth of the population:**

Reproduction, immigration and emigration, food, predators, competitors, parasite, self-regulation, temperature, oxygen, light availability, pollutants, climate change and disaster. Points related to women's education, health, self-regulation - human reproduction - family planning.

- (iii) **Characteristics of 'r' strategy:**

- Small size of organism.
- Energy used to make each individual is low.
- Many offspring are produced.
- Early maturity.
- Short life expectancy.
- Each individual reproduces only once.
- Little or no parental care.
- Most offspring die before reaching reproductive age.
- Adapted to unstable climate and environmental conditions.
- Low ability to compete.
- Population fluctuates widely above and below carrying capacity.
- Generalized niche.
- Density independent.
- Type III survival ship pattern or concave.

*(Any four)*

<p>(iv)</p>	<p>Differences between a <i>national park</i> and a <i>sanctuary</i>:</p> <p><b>National Park:</b></p> <ul style="list-style-type: none"> <li>• Habitat centric</li> <li>• Ownership of land not allowed</li> <li>• Harvesting of forest produce not allowed</li> <li>• No human habitation allowed</li> <li>• Well defined boundaries</li> <li>• Formed by central or state legislation</li> </ul> <p><b>Sanctuary:</b></p> <ul style="list-style-type: none"> <li>• Species centric</li> <li>• Private ownership of land not allowed</li> <li>• Harvesting of minor forest produce allowed</li> <li>• Restricted human habitation is possible</li> <li>• Boundary not well defined</li> <li>• Formed by order of state or central government</li> </ul> <p style="text-align: right;">(Any two)</p>									
<p>(v)</p>	<p><b>Primary pollutants:</b></p> <p>These pollutants are harmful when they are emitted. They may undergo chemical reactions in air to produce other harmful substances, e.g. SPM, smoke, Sulphur dioxide, carbon monoxide, oxides of nitrogen, benzene, hydrogen sulphide, fluoride.</p> <p><b>Secondary pollutants:</b></p> <p>These pollutants are formed by chemical reactions in the atmosphere. <i>e.g.</i>, ozone, acid rain, PAN, smog, POP (Primary Organic Pollutant).</p>									
<p>(vi)</p>	<p><b>Socio-economic benefits of cottage industries:</b></p> <p>Need less capital, more people involved, more job opportunities, less disputes, meet local needs, make villages self- sufficient, self-reliant, equal distribution of resources, lead to socio economic reform. Use of human and animal powers.</p> <p style="text-align: right;">(Any two)</p>									
<p>(vii)</p>	<p><b>Food adulteration:</b> Food adulteration is the <u>deliberate addition</u> or mixing of <u>inferior, harmful</u>, substandard, useless, or unnecessary substances to food.</p> <p>Common food adulterants:</p> <table border="1" data-bbox="256 1678 1417 1821"> <thead> <tr> <th>S. No.</th> <th>Food</th> <th>Adulterants</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Besan (Gram flour)</td> <td>Kesari dal powder and metanil yellow colour</td> </tr> <tr> <td>2.</td> <td>Coffee</td> <td>Chicory, tamarind seeds</td> </tr> </tbody> </table>	S. No.	Food	Adulterants	1.	Besan (Gram flour)	Kesari dal powder and metanil yellow colour	2.	Coffee	Chicory, tamarind seeds
S. No.	Food	Adulterants								
1.	Besan (Gram flour)	Kesari dal powder and metanil yellow colour								
2.	Coffee	Chicory, tamarind seeds								

	3.	Jaggery	Mud, metanil yellow
	4.	Honey	Sugar syrup
	5.	Butter	Starch
	6.	Red chilli power	Brick powder
	7.	Milk	Water, starch
	8.	Black pepper	Papaya seeds
	9.	Mustard seeds	Argemone seeds
	10.	Mustard oil	Argemone oil
	11.	Arhar dal	Kesari dal
	12.	Apples	Dipped in vegetable wax & acid/CuSO <sub>4</sub> to give it a waxy or greener colour or waxy appearance.
(viii)	<p>Full forms:</p> <p>(a) <b>MFN</b> – Most Favoured Nation</p> <p>(b) <b>EPR</b> – Extended Producer Responsibility</p>		
(ix)	<p>On the basis of the distribution natural resources are classified into:</p> <ul style="list-style-type: none"> <li>• <b>Ubiquitous resources</b> – Found everywhere. (<i>e.g.</i>, air, light, etc.)</li> <li>• <b>Local resources</b> – copper, coal, geothermal power, etc.</li> </ul>		
(x)	<p><b>Intellectual Property Rights (IPR)</b> is the rights of ownership of intangible intellectual properties like creative work, idea or invention.</p> <ul style="list-style-type: none"> <li>• Patent</li> <li>• Trademark</li> <li>• Copyright</li> <li>• Trade secret</li> <li>• Geographical indicator</li> <li>• Industrial design</li> </ul> <p style="text-align: right;"><i>(No explanation needed)</i></p>		

## PART II (50 Marks)

Answer *five* questions in all, choosing at least one question from each of the Sections A, B, and C.

### SECTION A

#### Question 2

- (a) What is *sustainable development*? Explain any *five* basic principles of sustainable development. [6]
- (b) Give a biographical sketch of Wendell Berry with special reference to his work on environment. [4]

Comments of Examiners	Suggestions for Teachers
<p>(a) Most of the candidates wrote the definition of Sustainable Development, correctly. However, in some cases, the operative phrases such as "ability of future generations to meet" were missing. Some did not have a detailed concept of the principles of Sustainable Development and they repeated the definition in one way or the other. A few candidates confused <i>sustainable development</i> with <i>sustainable agriculture</i>.</p> <p>(b) Most candidates attempted this question correctly, but some got confused between Wendell Berry and Barry Commoner. Some candidates wrote the place of birth and personal life of Wendell Berry correctly but jumbled up the names of the books written and the work and contribution towards the society.</p>	<ul style="list-style-type: none"><li>▪ Explain basic principles and other aspects of sustainable development in detail to the students.</li><li>▪ Train students to write proper headings along with the explanation.</li><li>▪ Advise students to prepare a flow chart to study the biographical sketch of environmentalists and put down the important dates, place, literary works, and environment related work.</li><li>▪ Use audio visuals like power point presentations and videos on the life of environmentalists to supplement classroom teaching.</li></ul>

### MARKING SCHEME

#### Question 2

- (a) **Sustainable development:** Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
- The holistic approach: All things are interrelated. Any change would lead to an environmental disbalance, if not dealt in a judicious manner.

	<ul style="list-style-type: none"> <li>• The principle of social justice: fundamental human rights must be guaranteed to all. Equal opportunities to acquire desired knowledge and skill should be available to everyone.</li> <li>• The principle of integration: Local, regional and national activities must be coordinated such that the implementation of any policies, plans are socially and economically viable to all.</li> <li>• The principle of inter-generational and intra-generational solidarity: development of all kinds should address the needs of all segments of the society, such that neither the present nor the future generations are adversely affected.</li> <li>• The principle of utilizing local resources: all efforts need to be made in making use of all resources available locally, so as to maintain the uniqueness of a particular region.</li> <li>• Guaranteed fundamental human right for each and every individual: every individual must have equal access to educational and development skills so that each can hold a respectable place in the society.</li> <li>• The principle of public participation: adequate access to information affecting social/economic life and environment, information on decision making processes must be provided to all. Public participation on decision making must be strengthened.</li> <li>• The principle of social responsibility: to enable sustainable development and make higher quality of life possible. Unsustainable patterns of production and consumption has to be stopped.</li> <li>• The principle of precaution and prevention: precautionary approach to where the possibility of irreversible damage is dealt with without waiting for complete data. Human activity must be carried out in a planned manner to reduce possibility of environmental damage.</li> <li>• The principle of sustainable management of resources: utmost care and effort must be made towards sustainability. We need to live within the carrying capacity of an ecosystem.</li> </ul> <p style="text-align: right;"><i>(Any five)</i></p>
(b)	<p>Biographical sketch of Wendell Berry with special reference to his work on environment:</p> <p>He is a poet, farmer and a prolific writer of both fiction and non-fiction.</p> <p>He has written more than 30 books. He took part in a non-violent civil disobedience march against the construction of a nuclear power plant in Indiana. He spoke for sustainable agriculture and also came out strongly against the death sentence. He was environmental conscience and protested for closure of coal-based factories and put a halt to coal mining.</p> <p>He believed that good life encompasses sustainable agriculture, appropriate technology, connection to place, healthy rural communities, good food, the miracle of life, fidelity, frugality and reverence.</p>

### Question 3

- (a) What are soil *indicators*? Name *any five* types of soil indicators and give *one* significance of each one of them. [6]
- (b) What is meant by *demographic transition*? Explain the *first three* stages of demographic transition. [4]

Comments of Examiners	Suggestions for Teachers
<p>(a) Majority of the candidates answered this question correctly. However a few candidates did not give the significance of the five types of indicators and some repeated the type of indicator, using different words for the same type e.g. water retention of the soil and the capacity of soil to take in water, were given as two different types. Some candidates did not know the meaning of “significance” and hence wrote about the method to determine the indicator like pH, etc.</p> <p>(b) This was a well attempted question. However, a few candidates wrote about demographic curves and drew diagrams instead of explaining stages of demographic transition.</p>	<ul style="list-style-type: none"><li>▪ <i>Train student to comprehend the meaning of indicators.</i></li><li>▪ <i>Present the types of soil indicators and their significance in agriculture in a tabular form for effective learning.</i></li><li>▪ <i>Emphasize the three parts of indicators - the indicator, the significance and the method to find out the value or amount of that indicator in the soil.</i></li><li>▪ <i>Instruct students to match the indicators with the characteristics of good soil.</i></li><li>▪ <i>Incorporate some simple lab activities while teaching about soil indicators.</i></li><li>▪ <i>Cite examples of different countries which have passed demographic transition in recent years.</i></li><li>▪ <i>Explain the different stages of transition with reference to pre and post industrialization, for better understanding.</i></li><li>▪ <i>Relate the growth and fall of birth and death rates according to the prevailing conditions of the country.</i></li><li>▪ <i>Explain the meaning of each word like “demographic” and “transition” separately.</i></li><li>▪ <i>Tabulate the three stages of transition and their causes and consequences with respect to different nations.</i></li></ul>

## MARKING SCHEME

### Question 3

(a) Soil indicators help us in monitoring soil quality. They tell us about the health of the soil and how suitable it would be to grow any particular type of crop. There are basically three kind of indicators: physical, biological, and chemical.

Physical indicators include:

- Soil texture which refers to the size and relative proportion of sand, silt, and clay in the soil. It gives fairly good idea of soil fertility.
- Soil Compaction - it depends on the clay content of the soil and the repeated use of machinery. A highly compact soil leads to low infiltration, rate, poor drainage, and aeration and leads to poor health of soil.
- Soil aggregate - soil particles are bound together to form soil aggregates, stability indicates rapid infiltration and percolation of water, sufficient retention of water and well aerated.
- Soil crusting - soil crusting happens due to drying up of the topsoil after rainfall. It is seen where the topsoil has dispersible clay particles it indicates slow rate of germination.
- Water retention capacity - it depends on soil texture and structure. Fine textured soils retain more water than coarse textured soil. These are prone to leaching as they cannot hold nutrients without clay.
- Infiltration rate - a rapid water movement downwards indicates a good pore space and aggregate stability, slow movement of water indicates soil compaction, lack of diversity and the number of organisms present in the soil.
- Biological indicators include microbial population, organic matter content - its decomposition is brought about by soil microorganisms. The more the soil organic matter, the better is the soil health, nitrogen mineralization - the conversion of non-available nitrogen to its useable form by microorganisms. More nitrogen available for the plants better is the soil health and soil respiration - high soil respiration is indicative of more microbial activity in the soil, hence indicates healthy soil
- Microbial population includes bacteria, fungi, actinomycetes and algae. Soil should contain larger proportion of beneficial organisms in order to be healthy.
- Chemical indicators include pH value of soil and soil salinity.

(b) **Demographic transition:**

Change from high birth rate and death rate to low birth rate and death rate. A transition from pre-industrial to industrial economic system.

Stage 1 - Pre-industrial: High birth rate and death rate population - roughly in balance.

Stage 2 - Fall in death rate due to improvement in food supply, sanitation and medical advancement. Birth rate continues to be high. A sudden growth in population.

Stage 3 - Birth rate falls due to access to contraception, better lifestyle, women empowerment, etc. Population begins to level off.

## Question 4

- (a) Discuss *any six* functions of the State Pollution Control Board. [6]
- (b) Explain *any four* threats to the ecosystem. [4]

Comments of Examiners	Suggestions for Teachers
<p>(a) Majority of the candidates attempted this question correctly. Many candidates could not write six functions. Some candidates repeated the functions. A few candidates mixed up the functions of the State Pollution Control Board with the Central Pollution Control Board.</p> <p>(b) This question was attempted correctly by most candidates. Some candidates mentioned the threats to the ecosystem without adequate explanation. In a few cases, the points were overlapping.</p>	<ul style="list-style-type: none"> <li>▪ <i>Instruct students to compare and tabulate both State and Central Pollution Control Boards separately in terms of their functions. They must discuss the operative words.</i></li> <li>▪ <i>Clarify the difference between “measures” and “functions”.</i></li> <li>▪ <i>Discuss points of causes, threats, remedies to our ecosystem in detail.</i></li> <li>▪ <i>Train students to write the points with proper explanation without overlapping of content.</i></li> </ul>

## MARKING SCHEME

### Question 4

- (a) Functions of the State Pollution Control Board:
- To plan and execute a comprehensive programme for prevention, control, or abatement of air pollution.
  - To advise the state government in all matters concerning pollution.
  - To collect and disseminate information relating to pollution.
  - To collaborate with the central board in organising, training of persons engaged in pollution related programmes and also organize mass education programmes.
  - To inspect any control equipment, industrial plant or manufacturing unit and give necessary directions to prevent, control, abate air pollution.
  - To inspect air pollution control areas at regular intervals and take necessary steps to regulate air pollution.
  - To lay down, in consultation with the central board, standards for emission of air pollution.
  - To advise the state government with respect to suitability of any premier or location of industry which is likely to cause air pollution.

	<ul style="list-style-type: none"> <li>To carry out any work concerning pollution given by the central board or state.</li> </ul> <p style="text-align: right;"><i>(Any six)</i></p>
(b)	<p>Threats to the ecosystem are:</p> <ul style="list-style-type: none"> <li>habitat destruction</li> <li>genetic erosion</li> <li>loss of biodiversity</li> <li>expanding agriculture</li> <li>impound water</li> <li>waste generation</li> <li>increasing resource consumption.</li> <li>loss of crop and grazing land</li> <li>depletion of world's tropical forest</li> <li>shortage of freshwater resources</li> <li>pollution and climate change</li> <li>disaster – anthropogenic, natural.</li> </ul> <p style="text-align: right;"><i>(Any four threats)</i></p>

## SECTION B

### Question 5

- (a) Define *sustainable agriculture*. Explain *any five* elements of sustainable agriculture. [6]
- (b) Write a short note on the privatization of water in Cochabamba. [4]

Comments of Examiners	Suggestions for Teachers
<p>(a) Many candidates attempted this question well. There was a broad range of points as elements of sustainable agriculture, but some candidates wrote incomplete answers. Candidates could not define sustainable agriculture. They misinterpreted it as sustainable development or pre-colonial agriculture or green revolution. A few candidates wrote elements of green revolution as elements of sustainable agriculture.</p> <p>(b) Most candidates wrote the reason for privatization of water in Cochabamba correctly. Some candidates did not mention the role of the World Bank in initiating the privatization of water which</p>	<ul style="list-style-type: none"> <li>Clarify the difference between <i>Sustainable development and Sustainable Agriculture</i>. Teach the elements of sustainable agriculture with explanation of specific examples to avoid confusion among students.</li> <li>Give adequate written practice of long answer questions.</li> <li>Lay stress on explaining each point properly mainly in long answer questions.</li> </ul>

led to the water crises. Many candidates were unable to give a sequential explanation of the case study in terms of the problem, effect and the solution.

- *Support the lesson with videos/field trips or talk session/s, to enrich the student's learning experience.*
- *Use Mind maps and flow chart/s while teaching Sustainable agriculture in the class.*
- *Explain the case studies of urban planning and management in the form of a tabular format about the problems, mitigation initiatives and results.*
- *Discuss the main reason which triggered off the conflict between the government and the citizens of Cochabamba in detail.*
- *Show videos related to the case studies in class or share the links with students so that students comprehend each case study distinctly.*

## MARKING SCHEME

### Question 5

(a)	<p><b>Sustainable agriculture:</b> Successful management of resources for agriculture to satisfy changing human needs, while maintaining or enhancing the quality of environment and conserving natural resources is called sustainable agriculture.</p> <p>Elements of sustainable agriculture are:</p> <ul style="list-style-type: none"> <li>• Mixed farming</li> <li>• Mixed cropping</li> <li>• Inter cropping</li> <li>• Crop rotation</li> <li>• Use of sustainable practices of water, soil, and pest management.</li> <li>• Use of bio-fertilizers and bio-pesticides, etc.</li> </ul>
(b)	<p>Privatization of water may lead to the third world war.</p> <p><b>Problem:</b> Privatization of water supply by the government causing hefty hike in water tariff impose to construct a dam and pay off the debt of the government owned company which was providing water to the city. The World Bank had suggested the privatization to repair</p>

	<p>and maintain the waterwork which reduce its efficiency and was supplying water at 40% of its capacity.</p> <p>Initiatives for mitigation: middle class people protested. The main beneficiaries of the subsidy, farmers, teachers, police joining hands under the banner of Morales, Campichino movement.</p> <p>In retaliation to police firing, the protesters became wild and paralyzed the country by nationwide road blockades.</p> <p>Result: The controversial amendment was scrapped, and the agreement was revoked. Water supply continues to function at 40% capacity. Economically weaker sections have to make do with contaminated water from water tankers. Cochabamba’s once rich green fertile valley has been reduced to arid dust bowl.</p>
--	--

## Question 6

- (a) What is meant by *new urbanism*? Discuss *any five* goals of smart growth in new urbanism. [6]
- (b) Discuss *any two* social and *two* ecological impacts of green revolution. [4]

Comments of Examiners	Suggestions for Teachers
<p>(a) Majority of the candidates answered this question well. However, a few candidates could not define <i>new urbanism</i>. They missed out the operative phrases. Goals of smart growth were explained by most candidates without using headings and points.</p> <p>(b) Majority of the candidates attempted this question correctly, but some wrote only the social impacts, while others wrote only the ecological impacts. Some got confused and wrote the economic impacts instead.</p>	<ul style="list-style-type: none"> <li>▪ <i>Explain clearly the difference between New Urbanism and Urbanization.</i></li> <li>▪ <i>Stress upon the importance of key words like, “integrate the best features of both urban and rural living”.</i></li> <li>▪ <i>Emphasise the concept of "Green Revolution", it’s positive and negative effects and the social, economic and ecological impact.</i></li> </ul>

## MARKING SCHEME

### Question 6

(a)	<p><b>New Urbanism:</b> It is a concept where the planners attempt to integrate the best features of both, urban and rural living.</p> <p><b>Goals:</b></p> <ul style="list-style-type: none"> <li>• To create a positive self-image for the community.</li> </ul>
-----	--

- To do away with substandard housing.
- To solve all problems concerned with urbanization such as housing, transportation, pollution, etc.
- To improve communication.
- To make cities liveable.
- Regional planning for open space.
- Balanced development of job and housing.
- Strategies to reduce traffic congestion.
- Increase affordable housing.
- Safe streets, green building.
- Communities designed for pedestrian and transit.
- Universally accessible public spaces.
- Appropriate technology and heritage conservation.

*(Explanation: one line only)*

(b) Social and ecological impacts of **green revolution**:

**Social:** Decreased food security, increased gap between rich and poor farmers, shift from subsistent to market oriented crop, less starvation but more malnutrition, centralised control of water leads to inter-state disputes, marginal farmers cannot compete and are the losers.

**Ecological:** Building Dams - Vast tracts of productive lands submerged

- Multiplication of disease-causing organisms
- Sedimentation and increased evaporation of water
- Earthquakes

HYV seeds – disturbs nitrogen cycle

- Excessive water intake
- Loss of biodiversity

Fertilizers - Eutrophication

- Soil salinization
- Makes plants vulnerable to diseases

Pesticides - Biomagnification

- Kills useful organisms
- Soil toxicity

*(Any two to be explained)*

## Question 7

- (a) What is food preservation and processing? Why do we need it? Discuss *any three* methods of food preservation and processing. [6]
- (b) What is meant by *food additives*? Discuss *any three* health hazards caused by food additives. [4]

Comments of Examiners	Suggestions for Teachers
<p>(a) Many candidates considered the food processing and food preservation as the same. The term <i>processing</i> in the question was totally missed out by most of the candidates. Some candidates wrote about traditional methods but very few were familiar with the modern methods. Some candidates mistook <i>food preservation</i> as <i>food additives</i>. A few candidates wrote on packaging and transportation instead of the methods of food preservation and processing.</p> <p>(b) Many candidates mistook food additives for food adulterants. Most candidates wrote the health hazards, but they did not write which food additive causes which health impact. Health hazards were not written as substance specific but were explained as the effect on certain physiological systems of human body or as symptoms.</p>	<ul style="list-style-type: none"> <li>▪ <i>Teach the concept of food preservation and food processing and their methods with specific examples from everyday life.</i></li> <li>▪ <i>Emphasise the difference between food processing and food preservation along with all the traditional methods of preservation.</i></li> <li>▪ <i>Familiarise students with the modern methods food processing and preservation.</i></li> <li>▪ <i>Clarify the differences between food preservatives and food additives with specific examples form each category, using common examples of the same.</i></li> <li>▪ <i>Explain the use of adulterants and additives with ample examples.</i></li> <li>▪ <i>Allow students to take up a project bringing different raw and cooked foods in the class and discuss the nature of the various ingredients used in each of the food items.</i></li> <li>▪ <i>Advise students to comprehend the definitions/operative terms / phrases and then learn.</i></li> </ul>

## MARKING SCHEME

### Question 7

(a) **Food preservation and processing:**

- Processing is the conversion of farm produce into more consumable form, example- conversion of wheat into flour, preparation of butter, ghee from milk. Its advantages surplus produce maybe conserved and reduces the work at home. Food processing and preservation are processes involved in protecting food against microbes and other spoilage agents to permit its future consumption. The preserved should retain a palatable appearance, flavour, texture and its original nutritional value. There is no single method of food preservation that provides protection against all hazards for an unlimited period of time. Some of the traditional methods of preservation are:
- Canning- it is sometimes called sterilisation because the heat treatment which the food undergoes eliminates all microorganisms that can spoil the food.
- Freezing- though pre-historic humans stored meat in ice caves the food industry is more recent. It preserves food from microorganism from multiplying. The process does not kill all types of bacteria, however, those that survive reanimate in thawing food and grow more rapidly. Enzymes in the frozen state remain active at a reduced rate.
- Drying and dehydration- though both these terms are applied to the removal of water, in food technology drying refers to natural desiccation as drying fruit in the sun, and dehydration designates drying by artificial means such as a blast of hot air.
- Other traditional methods are smoking, salting, keeping the food in excess amount of sugar and salt, etc.

- (b) **Food additives:** Food additives are the chemicals added to food to improve flavour, colour and the shelf life. They are meant to enhance taste, attractiveness, and preservation of foods.
- Anamine causes lesions in liver and kidneys, allergy, respiratory disorder, insomnia.
- Congo red – stomach pain, mental retardation, brain, and nerve damage.
- Lead chromate – anemia, abortion, paralysis, mental retardation and brain damage.
- Malachile green – tumour of lungs, breast, ovary and liver. Abnormalities of skin and eyes.
- Orange I – diarrhea.

## SECTION C

### Question 8

- (a) What is meant by *natural capital*? What is the importance of preserving it? State the methods of regenerating natural capital. [6]
- (b) Give *four* advantages and *four* disadvantages of GNP. [4]

Comments of Examiners	Suggestions for Teachers
<p>(a) Majority of the candidates attempted this question well. However, a few mixed up the definition of natural capital and its importance and did not write them separately. In some cases, the definitions given were incomplete. Several candidates mixed up <i>importance</i> with <i>regeneration</i>.</p> <p>(b) Most of the candidates could not write all the four advantages/disadvantages and settled for two or three points. Some candidates wrote advantages / disadvantages of GDP instead of GNP.</p>	<ul style="list-style-type: none"> <li>▪ <i>Teach the meaning of Natural Capital, its need, methods of regenerating natural capital, etc. in detail.</i></li> <li>▪ <i>Stress upon the difference between natural resources and natural capital.</i></li> <li>▪ <i>Explain GNP with the help of real-life examples which relevance to our country.</i></li> <li>▪ <i>Explain GDP and GNP together by differentiating between the two for conceptual clarity to the students.</i></li> <li>▪ <i>Teach the advantages and disadvantages of GDP and GNP with the help of a comparison chart.</i></li> </ul>

<b>MARKING SCHEME</b>	
<b>Question 8</b>	
(a)	<p><b>Natural Capital:</b> Natural capital is the land, water, air, living organisms and all formations of earth’s biosphere that provide us with ecosystem goods and services which are essential for our survival on earth.</p> <p>Importance of preserving natural capital:</p> <ul style="list-style-type: none"> <li>• Natural capital provides basic and fundamental life support sources which no other capital can provide. Life is not possible without a minimum amount of natural capital. Life support resources cannot be substituted by any other.</li> <li>• Most of natural capital cannot be renewed once destroyed.</li> <li>• For any kind of production, a minimum amount of natural capital is needed.</li> </ul> <p>Regeneration of natural capital:</p> <ul style="list-style-type: none"> <li>• Population control</li> <li>• Reduction of pollution</li> <li>• Use of renewable resources, etc.</li> <li>• Judicious use of non-renewable resources and wherever possible we should use their substitute.</li> </ul>

(b)	<p>Advantages and disadvantages of GNP:</p> <p><b>Advantages:</b></p> <ul style="list-style-type: none"> <li>• Easy to calculate.</li> <li>• Indicates the economic condition of the country.</li> <li>• Measures the value of goods and services of the country irrespective of location.</li> <li>• Possible to compare the wealth of one country with that of another.</li> </ul> <p><b>Disadvantages:</b></p> <ul style="list-style-type: none"> <li>• Does not take into account locally produced and consumed goods.</li> <li>• Unpaid economic activities are ignored.</li> <li>• Environmental impact not taken into consideration.</li> <li>• Comparison of incomes of two countries may be distorted by changing exchange rate.</li> <li>• Does not include sale of used goods.</li> </ul>
-----	--

## Question 9

- (a) Discuss the ecological values of the rain forests of Amazonia. [6]
- (b) What is *Physical Accounting System*? What is its aim? State *two* advantages and *two* disadvantages of Physical Accounting System. [4]

Comments of Examiners	Suggestions for Teachers
<p>(a) Majority of the candidates attempted this question well, but some wrote the economic values instead of the ecological values. Many candidates wrote about the mitigation measures for the degradation of the rain forest.</p> <p>(b) Most candidates answered this question well. However, some mixed up the <i>definition</i> and the aim Physical Accounting System. Advantages and disadvantages were not correlated properly by some candidates. Many candidates wrote the same points for advantages and disadvantages.</p>	<ul style="list-style-type: none"> <li>▪ <i>Teach the different values of the ecosystem with common examples from each category for conceptual clarity.</i></li> <li>▪ <i>Familiarise students with different ecological terms and the difference between economy and ecology.</i></li> <li>▪ <i>Train students to write crisp and precise definitions, highlighting the key words.</i></li> <li>▪ <i>Clarify the concept of physical accounting in a sequential manner with lots of common examples to support the concept and emphasise the significance of this concept.</i></li> <li>▪ <i>Give sufficient time for teaching and for recapitulating concepts like CBA, NRA and externalities.</i></li> </ul>

## MARKING SCHEME

### Question 9

(a) The ecological values of the rain forests of Amazonia:

**Ecological values are:**

- Regulation of chemical composition of air
- Climate regulation
- Water regulation
- Water shed management
- Nutrient cycle
- Soil formation
- Erosion control
- Buffer to natural disasters
- Waste treatment
- Pollination
- Food production
- Genetic resonances
- Prevention of flooding
- Prevention of siltation

(b) Physical Accounting System: This refers to the natural resources and environmental accounting of stocks and changes in stocks in physical (non-monetary) units, e.g. weight, area, or number. Qualitative measures, expressed in terms of quality classes, types of uses or ecosystem characteristics, may supplement quantitative measures.

**Aim:**

The basic principle underlining this method is that material flow balances in physical unit of material, water and energy flow within a defined system boundary. Thus, in such systems, physical measures are defined to suit the environmental policy.

**Advantages:**

Physical accounting is more accurate evaluation of natural resources such as groundwater water and forest cover have no market price.

Physical accounting is more long term as the changes in volume, number and quantity can be compared over generations and not to be influenced by short period market fluctuations.

**Disadvantages:**

Physical accounting is more difficult to interpret as it does not have any single dimension as monetary accounting (rupees, dollars, etc.). The qualitative aspects of natural resources do not get reflected readily. Accurate accounting for qualitative differences requires more and more disaggregation which makes interpretation cumbersome.

## Question 10

- (a) What is *globalization*? Give *any five* advantages of globalization. [6]
- (b) Explain *any four* impacts of hazardous waste. [4]

Comments of Examiners	Suggestions for Teachers
<p>(a) Majority of the candidates attempted this question successfully. A few repeated the same points just to make the count to five advantages.</p> <p>(b) This part was very well answered by most candidates. However, a few gave the impact of hazardous waste in the form of all kinds of diseases. Some candidates could not give specific examples of the various types of hazardous wastes and their subsequent impacts. They were unable to specify all four impacts of hazardous waste.</p>	<ul style="list-style-type: none"> <li>▪ <i>Discuss globalization and its advantages and disadvantages thoroughly.</i></li> <li>▪ <i>Teach specific examples of all kinds of hazardous wastes with their respective impact on the specific part of the environment.</i></li> <li>▪ <i>Clarify the meaning of hazardous waste before teaching Basel and Bamako Conventions.</i></li> </ul>

## MARKING SCHEME

### Question 10

- (a) **Globalization:**  
 Globalization is system of interaction among the countries of the world in order to develop the global economy.  
 Involves technical, economic, political and cultural exchanges due to advance in communication, transportation and infrastructure.  
*(Either one of the two points)*
- Advantages:**
- Wider range of products / options for people to buy and sell.
  - Developing countries benefit as there is a flow of money, decrease in currency difference.
  - To meet the increasing demands, there is an increase in the production giving options to the manufacturers as well.
  - Competition keeps prices relatively low; inflation is less likely to occur.
  - No country remains the single power head, instead there are compartmentalized power sectors.
  - Allow better communication and understanding between nations.
  - There is interchange of cultures.

	<ul style="list-style-type: none"> <li>• The ecological imbalance is lessened, and governments of countries show concern about each other.</li> <li>• As countries see to each other's financial needs the ecological imbalance is sorted out for example, increased pollution, environmental degradation.</li> </ul> <p style="text-align: right;"><i>(Any five advantages)</i></p>
(b)	<p><b>Impacts of hazardous waste:</b></p> <ul style="list-style-type: none"> <li>• May pollute air, soil, surface water and underground water.</li> <li>• The polluted air has an adverse effect on human health and causes diseases like respiratory disorders.</li> <li>• The pollutant in the water causes enteric diseases.</li> <li>• Ground water pollution can lead to lead poisoning.</li> <li>• Toxic wastes in the soil can denude the landscape.</li> <li>• The non-degradable toxic waste may enter the food chain and through biomagnification affect both, animals and human beings.</li> <li>• Radio-active waste can cause cancer.</li> <li>• Causes genetic disorder/ mutation/ cancer</li> <li>• Damages/ degrade the environment.</li> <li>• Respiratory disorders.</li> <li>• Impact health.</li> </ul> <p style="text-align: right;"><i>(Any four impacts)</i></p>

## GENERAL COMMENTS



- Primary & Secondary Pollutants.
- Food adulteration.
- Food additives.
- Acronym EPR.
- Physical Accounting System

**Concepts in  
which  
candidates got  
confused**

- Wendel Berry & Barry Commoner
- Food Preservation & Food Processing; Food adulterants & Food additives
- Sustainable Agriculture & Sustainable Development
- GDP & GNP
- Ecological & Economic
- Functions of the State Pollution Control Board & Central Pollution Control Board

**Suggestions for  
students**

- Study all topics thoroughly. Avoid selective study.
- Focus on the synopsis or summarized points after every chapter.
- Lay stress on understanding the terms/concepts instead of rote learning.
- Learn main laws, principles and key-words/acronyms with proper understanding.
- Learn all the ecological terminologies, names and technical terms with correct spellings.
- Prepare short notes of the concepts using reference books, magazines, journals, projects, etc.
- Read the question carefully, understand it and then proceed.
- Attempt all parts and sub-parts of a question in proper sequence.
- Highlight the key words.
- Write the answer point wise and each point must reflect a separate idea.
- Write differences in a tabular form and ensure that the differences are compatible.
- Draw neat-labelled diagrams whenever required as per the question.
- Refer to different textbooks, journals and magazines.
- Practice writing the answers in the stipulated time.
- Practice drawing diagrams and labelling them correctly.
- Attempt previous years' ISC question papers.