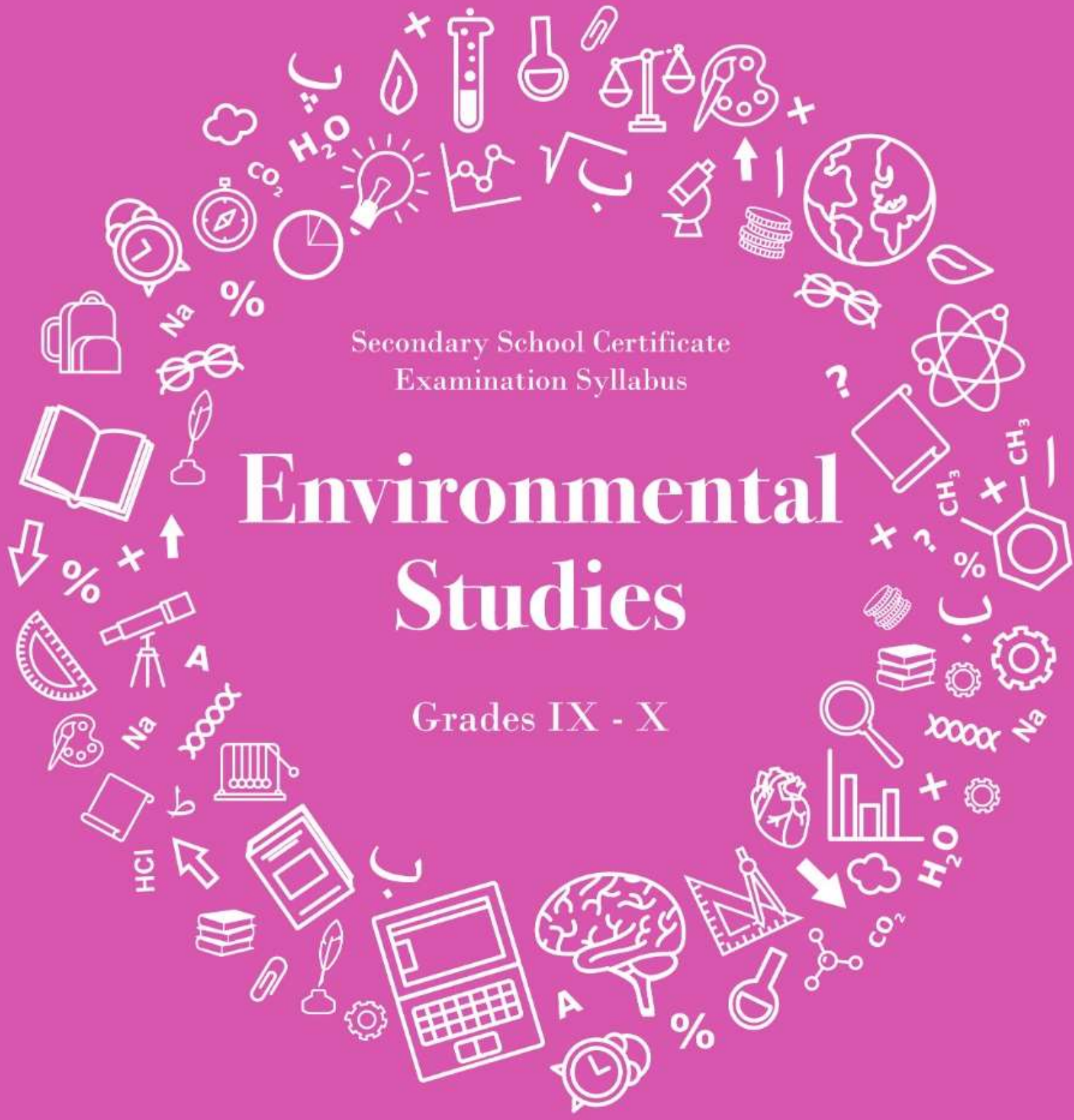
آغا خان یونیورسٹی ایگزامینیشن بورڈ

AGA KHAN UNIVERSITY EXAMINATION BOARD



Secondary School Certificate
Examination Syllabus

Environmental Studies

Grades IX - X

(based on National Curriculum 2007)

Published by
Aga Khan University Examination Board
Block - C, IED - PDC, 1-5/B-VII
Federal B. Area, Karimabad, Karachi, Pakistan.

Last Revision July 2009
Latest Revision December 2019

© The Aga Khan University Examination Board, 2019

All rights and entitlements reserved.
This syllabus is developed by Aga Khan University Examination Board for distribution to all its affiliated schools only. No part of this syllabus may be copied, reproduced or used for any other purpose whatsoever without prior written permission of the Aga Khan University Examination Board.

Secondary School Certificate
Examination Syllabus

ENVIRONMENTAL STUDIES

GRADES IX-X

This syllabus will be examined in both
May and September Examination sessions from
May 2021 for Grade IX and May 2022 for Grade X

Table of Contents	Page No.
Preface	5
Introduction to AKU-EB Syllabi	7
Aims/ Objectives of the National Curriculum (2007)	9
Subject Rationale	10
Student Learning Outcomes	12
Summary of Student Learning Outcomes (SLOs)	33
Scheme of Assessment	34
Acknowledgements	36

For queries and feedback

Address: Aga Khan University Examination Board
Block - C, IED - PDC, 1-5/B-VII
Federal B. Area, Karimabad, Karachi, Pakistan.
Phone: (92-21) 3682-7011
Fax: (92-21) 3682-7019
E-mail: examination.board@aku.edu
Website: http://examinationboard.aku.edu
Facebook: www.facebook.com/akueb

Preface

Established in 2002 through Ordinance CXIV, the Aga Khan University Examination Board (AKU-EB) is Pakistan's first private autonomous examination body for secondary (SSC) and higher secondary (HSSC) school certifications. Its vision is to be a model of excellence and innovation in education in Pakistan and the developing world.

One of the ways in which AKU-EB achieves its vision is by developing syllabi which inculcates conceptual thinking and higher order learning skills based on the National Curriculum. The AKU-EB revises its syllabi every 4 years so that they continue to meet the needs of students, teachers and examiners.

The aims of the current syllabus review of SSC and HSSC in 2016 were to:

- Ensure continued compatibility with the goals of the National Curriculum of Pakistan.
- Review the content for inclusion of new knowledge and deletion of obsolete knowledge.
- Review the content for clarity and relevance as per the changing needs of students, teachers and examiners.
- Enhance and strengthen continuation and progression of content both within and across grades IX - XII (SSC and HSSC).
- Ensure the readiness of students for higher education.

During this syllabus review, the needs of all the stakeholders were identified through a needs-assessment survey. Students and teachers of AKU-EB affiliated schools from across Pakistan participated in the survey. Thereafter, a revision panel, which consisted of examiners, teachers of affiliated and non-affiliated schools, teacher trainers and university academics, reviewed and revised the syllabus following a planned, meticulous and standardised syllabi review process.

The syllabus is organised into topics and subtopics. Each subtopic is further divided into achievable student learning outcomes (SLOs). The SLOs of the cognitive domain are each assigned a cognitive level on which they have to be achieved. These cognitive levels are 'knowledge', 'understanding' and 'application', the latter also including other higher order cognitive skills. This is followed by the Exam Specifications which gives clear guidance about the weightage of each topic and how the syllabus will be assessed.

The development of the revised syllabus has been made possible by the creativity and relentless hard work of Curriculum and Examination Development unit and the constant support provided by all the other units of AKU-EB. We are particularly thankful to Dr Sohail Qureshi for his very useful feedback on revising the syllabus review process, to Dr Naveed Yousuf for his continued guidance and support throughout the syllabus revision process and to Raabia Hirani for leading the syllabi revision. We are also thankful to all the students and teachers who took part in the needs-assessment survey and to the principals of AKU-EB affiliated schools who made this endeavour possible by facilitating and encouraging their teachers to be a part of the survey and the syllabus revision panel.

With your support and collective hard work, the AKU-EB has been able to take the necessary steps to ensure effective implementation of the National Curriculum of Pakistan through this syllabus. We are confident that this syllabus will continue to provide the support that is needed by students to progress to the next level of education and we wish all the best to students and their teachers in implementing this syllabus.

Dr Shehzad Jeeva
Director, Aga Khan University Examination Board
Assistant Professor, Faculty of Arts and Sciences, Aga Khan University

Introduction to AKU-EB Syllabi

1. The Aga Khan University Examination Board (AKU-EB) has a mandate by Ordinance CXIV of 2002 'to test the attainment of the objectives of the national curriculum, for the purpose of enhancing student learning, and to do all such things that may be considered appropriate for the improvement of education in respect to teaching and learning, institutional effectiveness and all things ancillary and incidental thereto'.

2. The AKU-EB syllabi are an important tool in the achievement of this mandate. These syllabi are based on the latest National Curriculum of Pakistan and the National Scheme of Studies. The syllabi bring together all those cognitive outcomes of the National Curriculum statement which can be reliably and validly assessed. Moreover, the syllabi aim to achieve the pedagogically desirable objectives of the National Curriculum which encourage 'observation, creativity and other higher order thinking skills', better meeting the needs of the students of the twenty-first century.

3. The syllabi guide the students, teachers, parents and other stakeholders regarding the topics that will be taught and examined in each grade (IX, X, XI and XII). In each syllabus document, the content progresses from simple to complex, thereby, facilitating a gradual, conceptual learning of the content.

4. The topics of the syllabi are divided into subtopics and **student learning outcomes (SLOs)**. The subtopics and the SLOs define the depth and the breadth at which each topic will be taught, learnt and examined. It complements the national curriculum by providing enabling SLOs where needed to scaffold student learning.

5. Each SLO starts with an achievable and assessable **command word** such as describe, relate, evaluate, etc. The purpose of the command words is to direct the attention of teachers and students to specific tasks that the students are expected to undertake in the course of their subject studies. The examination questions are framed using the same command words or their connotations to elicit evidence of these competencies in students' responses.

6. The SLOs are classified under three **cognitive levels**: knowledge (K), understanding (U) and application and other higher order cognitive skills (A) for effective planning during teaching and learning and deriving multiple choice questions and constructed response questions on a rational basis from the subject syllabi, ensuring that the intentions of the national curriculum are also met during examinations.

7. By focusing on the achievement of the SLOs, these syllabi aim to counter the culture of rote memorisation as the preferred method of examination preparation. While suggesting relevant, locally available textbooks for achieving these outcomes, the AKU-EB recommends that teachers and students use multiple teaching and learning resources for achieving these outcomes.

8. The syllabi follow a uniform layout for all subjects to make them easier for students and teachers to follow. They act as a bridge between students, teachers and assessment specialists by providing a common framework of student learning outcomes and **exam specifications**.

9. On the whole, the AKU-EB syllabi for Secondary School Certificate (SSC) provide a framework that helps students to acquire conceptual understanding of the content of the National Curriculum and learn to critically engage with it. This lays a solid foundation for HSSC and beyond.

Aims/ Objectives of the National Curriculum (2007)[1]

The National Curriculum for Environmental Studies outlines the following aims and objectives:

Aims

The curriculum of Environment Studies at grade IX-X level aims to help individual students to:

- Promote awareness about ecological systems, their interrelationship and biodiversity and its role in nature
- Develop understanding, skills and attitudes necessary to address environmental issues
- Develop sensitivity and concern for the environment so that they can actively participate in the efforts towards solving the environmental issues of the community
- Examine the impacts of human intervention on ecosystems and investigate ways to minimize them
- Develop and attitude of responsible and productive citizenship including respect for the environment and commitment to the wide use of resources.

Outcomes

A statement of Outcomes relevant to each of the general aims is listed below. The sequence is in no particular order.

a. Awareness:

To help students acquire awareness and sensitivity to the total environment and its allied problems

b. Knowledge:

To help students acquire a basic knowledge and understanding of the environment, active participation in its improvement, and resolution of its associated problems

c. Participation (applying knowledge):

To provide students with an opportunity to be actively involved at all levels in working towards the resolution of the environmental problems

d. Skills:

To help students acquire the skill for identifying and solving environmental problems

e. Attitude:

To help students acquire a set of values and feelings of concern for the environment and motivation for active participation in the activities regarding environmental improvement and protection

[1]Government of Pakistan (2007), *National Curriculum for Environmental Studies IX-X, Islamabad,* Ministry of Education (Curriculum Wing)

Subject Rationale of AKU-EB Environmental Studies

Why study AKU-EB Environmental Studies?

Imagine a world where we have trouble breathing; where there is a lack of resources such as food, water, and shelter; where the extreme weather conditions have made it difficult to carry out daily tasks. When the environment deteriorates, it causes mass starvation and many species might become extinct.

Therefore, the environment is important as it sustains us. The Earth has all the essential features of an environment that can sustain life. Its large reservoir of water and pure air along with the natural ozone umbrella (which protects against the Sun's dangerous ultraviolet radiations) provide the environment for us, human beings, and other life forms to survive. Without such an environment, life on earth might cease to exist. Our own activities are becoming a threat to the environment. Industrial and agricultural developments, along with a rising population have put a strain on the environment.

To protect the environment and ensure the survival of human beings, efforts need to be made. Environmental education is one of the most powerful tools that can help modify human behaviour towards the environment. Through environmental education, a student will be able to develop attitudes and skill sets to contribute towards improving and/ or maintaining the quality of the environment.

What will you learn in AKU-EB Environmental Studies?

The AKU-EB Environmental Studies syllabus is designed in such a way that it provides the opportunity for students to understand the structure, function and diversity of natural ecosystem on this planet. It helps students to understand what is in their environment, including living and non-living things, their interdependence and the impacts that humans have on the environment. It focuses on how we can better utilize and manage our environmental resources to avoid natural disasters like floods, landslides, bush fires and spread of diseases. It gives us the sense of a pleasant relationship between the natural environment and humans in order to keep our environment healthy for future generations. The syllabus attempts to develop the necessary problem-solving skills that would facilitate students to inspect and suggest alternatives to a variety of environmental complications. Furthermore, the use of multiple learning resources and reference books are encouraged to create interest in students and provide logical understanding of fundamental concepts of Environmental Studies.

Where will it take you?[2]

Environmental Studies is a multi-disciplinary subject where we deal with different aspects using a holistic approach. The study involved in this course will encourage students to become active citizens who can participate in community debates, resolve problems, and make decisions about existing issues. It permits students to meet the socio-cultural and socio-economic demands of our country and perform an important role in the development of the nation.

[2] Students may be required to study other subjects alongside in order to qualify for graduate studies in these fields.

It offers basic environmental literacy for candidates who would later pursue a wide variety of careers, but it is also meant to inspire and provide basic knowledge to others who would select careers directly related to the environmental field. While studying Environmental studies, students get knowledge inputs from various disciplines and they can continue their profession as:

- Life scientist to understand the biotic components and their interactions.
- Biotechnologist to find solutions to different environmental problems.
- Physicist, Chemist, and Geologist to understand the nature of abiotic components including mass and energy transfers.
- Mathematician and Computer Scientist in the field of environmental modeling.
- Chemical Engineer and Nanotechnologist to provide the technical solutions for various environmental issues.
- Environmental Lawyer to provide the guidelines and legal measures for effective management and protection of the environment.
- Environmental Educationist to create environmental awareness in the society.

Moreover, it allows candidates to analyse their own attitude towards the environment and improving the quality of life. It provides the foundation for advance studies, individual development and contribution in local and global environmental concerns along with producing effective policy makers of the future.

How to approach the syllabus?

The topics and the student learning outcomes (SLOs) guide regarding the details about what has to be achieved. And finally, the exam specification guides regarding what will be expected in the examination.

Student Learning Outcomes of AKU-EB SSC Environmental Studies

Part I (Grade IX)

Topics and Sub-topics		Student Learning Outcomes		Cognitive Level[33]		
				K	U	A
1. Fundamentals of Environmental Studies		Students should be able to:				
1.1	Introduction to Environmental Studies	1.1.1	define the term, 'environment';	*		
		1.1.2	describe briefly the historical perspective of Environmental Studies;		*	
		1.1.3	list some important international organisations and government departments [United Nation (UN) agencies, Civil Society Organisations (CSOs), Environmental Protection Agencies (EPA)] that are working for environmental protection;	*		
1.2	Scope and Importance of Environmental Studies	1.2.1	discuss the correlation of Environmental Studies with the following disciplines: a. Chemistry b. Physics c. Biology d. Sociology e. Economics f. Geography g. Geology h. Ethics;		*	
		1.2.2	describe the careers that a student can adopt after studying Environmental Studies;		*	
		1.2.3	discuss the importance of studying Environmental Studies and the way it modifies human behaviour towards the environment.		*	

FOR EXAMINATION IN MAY 2021 AND ONWARDS

[3] K = Knowledge, U = Understanding, A = Application and other higher-order cognitive skills

Topics and Sub-topics	Student Learning Outcomes		Cognitive Level		
			K	U	A
2. Our Planet - Earth	Students should be able to:				
2.1 The Earth	2.1.1	describe the solar system;		*	
	2.1.2	describe the chemical composition of Earth;		*	
	2.1.3	state the mass, equatorial radius, mean distance from the Sun, rotational period, orbital period and mean surface temperature of Earth;	*		
	2.1.4	explain the physical features which enable Earth to support life;		*	
	2.1.5	explain the formation of seasons with reference to Earth's tilt on its axis and its revolution around the Sun;		*	
	2.1.6	differentiate between a solstice and an equinox;		*	
	2.1.7	define the spheres of the Earth;	*		
	2.1.8	exemplify the interaction of different spheres of Earth;		*	
2.2 Atmosphere	2.2.1	mention the percentage composition of air;	*		
	2.2.2	describe the characteristics of the different layers of atmosphere;		*	
	2.2.3	differentiate between the characteristics of troposphere and stratosphere;		*	
2.3 Hydrosphere	2.3.1	explain the importance of hydrosphere;		*	
	2.3.2	list sources of fresh water;	*		
	2.3.3	discuss the importance of fresh water as a valuable resource for living organisms;		*	
	2.3.4	differentiate between the characteristics of sea water and fresh water;		*	
	2.3.5	suggest different ways of conserving water at home, industry, agriculture and community;			*

FOR EXAMINATION IN MAY 2021 AND ONWARDS

Topics and Sub-topics		Student Learning Outcomes	Cognitive Level		
			K	U	A
	Students should be able to:				
2.4 Lithosphere	2.4.1	describe different layers of the Earth: a. Core b. Mantle c. crust;		*	
	2.4.2	discuss the importance of lithosphere;		*	
2.5 Biosphere	2.5.1	discuss the importance of biosphere.		*	

FOR EXAMINATION IN MAY 2021 AND ONWARDS

Topics and Sub-topics	Student Learning Outcomes		Cognitive Level		
			K	U	A
3. Ecosystem	Students should be able to:				
3.1 Introduction to Ecology and Ecological Organisation	3.1.1	define ecology;	*		
	3.1.2	differentiate among the following levels of ecological organisation: a. species b. population c. community d. ecosystem e. biomes f. biosphere;		*	
3.2 Ecosystem and its Components	3.2.1	define ecosystem;	*		
	3.2.2	classify organisms as producers, consumers and decomposers;		*	
	3.2.3	explain the biotic and abiotic components of an ecosystem;		*	
3.3 Interactions in Ecosystem	3.3.1	define food chain and food web;	*		
	3.3.2	describe feeding and non-feeding relationships;		*	
	3.3.3	explain the feeding relations among the biotic components of the ecosystem, in terms of tropic levels, food chains and food webs;		*	
	3.3.4	explore the interrelationships and interdependence of organisms in a pond, lake, garden, forest and desert;			*
	3.3.5	draw food chains and food webs on the basis of the observations of a pond's, lake's, garden's, forest's and desert's ecosystem;			*

FOR EXAMINATION IN MAY 2021 AND ONWARDS

Topics and Sub-topics		Student Learning Outcomes		Cognitive Level		
				K	U	A
		Students should be able to:				
3.4	Flow of Material and Ecological Pyramids	3.4.1	explain the flow of materials and energy in the ecosystem;		*	
		3.4.2	differentiate among the following ecological pyramids with the help of using their illustrations: a. pyramid of numbers b. pyramid of biomass c. pyramid of energy;		*	
		3.4.3	explain the following biogeochemical cycles: a. water cycle b. carbon cycle c. nitrogen cycle;		*	
3.5	Aquatic and Terrestrial Ecosystem	3.5.1	examine the following types of ecosystems with reference to their types, characteristics and importance: a. aquatic ecosystem b. terrestrial ecosystem;			*
3.6	Habitat and Biomes	3.6.1	describe the terms, 'habitat' and 'biome';		*	
		3.6.2	list different types of habitat;	*		
		3.6.3	locate major biomes on a map, i.e. tundra, forests, grasslands, deserts, fresh water and marine;			*
		3.6.4	identify animals or plants indigenous to an environment by examining different pictures;		*	
3.7	Balance in Ecosystem	3.7.1	explain how natural ecosystems are self-regulatory and self-sustained;		*	
		3.7.2	discuss some human activities which have direct or indirect effects on the ecosystem.		*	

FOR EXAMINATION IN MAY 2021 AND ONWARDS

Topics and Sub-topics	Student Learning Outcomes		Cognitive Level		
			K	U	A
4. Population Growth, Development and Environment	Students should be able to:				
4.1 History of Human Population	4.1.1	define the following terms: a. population b. demography c. census;	*		
	4.1.2	describe, in terms of figures, the history of human population in global perspective;		*	
	4.1.3	describe the growth in the population of Pakistan from 1947 till date;		*	
	4.1.4	draw a graph of the history of human population growth, giving the years and the population numbers, and predicting the world population in the next 50 years;			*
4.2 Human Population Growth and its Consequence	4.2.1	describe the following terms: a. carrying capacity b. doubling time c. linear population growth d. exponential population growth;		*	
	4.2.2	discuss the impact of high growth of population on depletion of natural resources thus reducing carrying capacity;		*	
	4.2.3	describe natural and social factors that limit population growth such as carrying capacity and family planning;		*	

FOR EXAMINATION IN MAY 2021 AND ONWARDS

Topics and Sub-topics	Student Learning Outcomes		Cognitive Level		
			K	U	A
	Students should be able to:				
4.3 Population Dynamics	4.3.1	define the following terms: a. birth rates b. death rates c. growth rates d. migration e. urbanisation f. age distribution g. gender ratio;	*		
	4.3.2	explain the growth or decline in human population through the combined effects of births and deaths, and through emigration and immigration;		*	
	4.3.3	exemplify the influences of the following factors on human population growth: a. levels of affluence b. education c. health care d. child labour e. employment of women f. early marriages g. religious beliefs h. cultural norms i. lack of leisure activities;		*	
	4.3.4	explain the Malthusian theory of population;		*	

FOR EXAMINATION IN MAY 2021 AND ONWARDS

Topics and Sub-topics	Student Learning Outcomes		Cognitive Level		
			K	U	A
	Students should be able to:				
4.4 Population Projection	4.4.1	state the phenomenon of population projection;	*		
	4.4.2	explain the significance of population projections for planning development strategies;		*	
	4.4.3	describe the method used by demographers to compute population projections;		*	
	4.4.4	compare the year-wise increase in the population of various cities in Pakistan;		*	
	4.4.5	interpret charts and graphs showing year-wise increase in the population of Pakistan;			*
4.5 Relationship between Population Growth, Development and Environment	4.5.1	relate population with economic and agricultural growth;		*	
	4.5.2	relate human population with sustainable development and the environment;		*	
	4.5.3	recommend ways to address overpopulation to develop awareness about population welfare and quality of life;			*
	4.5.4	discuss the environmental rights and laws for the protection, conservation, rehabilitation and improvement of the environment such as Pakistan Environmental Protection Act (PEPA), 1997 and the Sindh Environmental Protection Act (SEPA), 2014.		*	

FOR EXAMINATION IN MAY 2021 AND ONWARDS

Topics and Sub-topics		Student Learning Outcomes		Cognitive Level		
				K	U	A
5. Air, Water and Land Pollution		Students should be able to:				
5.1	Pollution and its Types	5.1.1	define the terms, 'pollution' and 'pollutants';	*		
		5.1.2	discuss the following types of pollution: a. air pollution b. water pollution c. land pollution;		*	
5.2	Sources, Effects and Control Measures of Air Pollution	5.2.1	identify major air pollutants and their sources in the environment;		*	
		5.2.2	discuss fossil fuel combustion, transport and industries as the major causes of air pollution;		*	
		5.2.3	discuss the effects of air pollution on human health, animals and plants;		*	
		5.2.4	explain the adverse effects of smoking on smokers and passive smokers;		*	
		5.2.5	describe the weather conditions that may aggravate air pollution;		*	
		5.2.6	identify the different areas of your locality, city and country where air pollution has adverse effects on humans;		*	
		5.2.7	suggest different measures to control air pollution;			*
		5.2.8	suggest ways to improve the air quality on a personal and at community level;			*
5.3	Sources, Effects and Control Measures of Water Pollution	5.3.1	identify water pollutants and their sources in the environment;		*	
		5.3.2	discuss the sewage, industrial effluents and agricultural runoff as the major causes of water pollution;		*	
		5.3.3	describe water pollution caused by tanneries and factories (fertiliser, cement and paper);		*	

FOR EXAMINATION IN MAY 2021 AND ONWARDS

Topics and Subtopics		Student Learning Outcomes		Cognitive Level		
				K	U	A
		Students should be able to:				
		5.3.4	explain the impacts of polluted water on human health, agriculture and aquatic life;		*	
		5.3.5	discuss various water-borne diseases;		*	
		5.3.6	suggest ways to reduce water pollution;			*
		5.3.7	compare the methods of raw water treatment and wastewater (sewage) treatment with reference to the stages involved and their significance;		*	
5.4	Sources, Effects and Control Measures of Land Pollution	5.4.1	differentiate between biodegradable and non-degradable materials;		*	
		5.4.2	describe the municipal, industrial, agrochemical and hospital wastes as the major factors contributing towards land pollution;		*	
		5.4.3	discuss the effects of municipal, industrial, agrochemical and hospital wastes on human health;		*	
		5.4.4	discuss the importance of soil and its various degradation issues such as water logging, salinity and soil erosion;		*	
		5.4.5	suggest remedies to prevent soil erosion;			*
		5.4.6	explore the problems stemming from landfilling of refuse disposal;			*
		5.4.7	discuss environmental consequences of natural disasters, e.g. earthquakes, landslides, floods, storms, droughts, famine, cyclones, forest fires, tsunamis, volcanic eruptions, hurricanes and tornadoes;		*	
		5.4.8	suggest the most appropriate methods for solid waste disposal;			*
		5.4.9	describe the procedure, the pros and cons of converting waste into energy.		*	

FOR EXAMINATION IN MAY 2021 AND ONWARDS

Topics and Subtopics		Student Learning Outcomes		Cognitive Level		
				K	U	A
6. Noise and Radiation Pollution		Students should be able to:				
6.1	Sources, Effects and Control Measures of Noise Pollution	6.1.1	differentiate between the following: a. noise and musical sound b. acceptable and non-acceptable level of noise;		*	
		6.1.2	explain the two kinds of noise: c. community noise d. occupational noise;		*	
		6.1.3	describe the techniques used to measure noise pollution;		*	
		6.1.4	discuss the effects of noise pollution on human health;		*	
		6.1.5	suggest various ways to reduce noise pollution;			*
6.2	Sources, Effects and Control Measures of Radiation Pollution	6.2.1	define the term, 'radiation';	*		
		6.2.2	list different types of radiations;	*		
		6.2.3	describe the natural and man-made sources of radiations;		*	
		6.2.4	discuss the effects of various radiations on human health;		*	
		6.2.5	prepare a small report on various radiation sources and their effects on our surroundings;			CA[4]
		6.2.6	discuss somatic and genetic effects of radiation;		*	
		6.2.7	suggest measures to avoid radiation exposure in our daily life;			*
		6.2.8	explore the problems associated with radioactive waste disposal;			*
		6.2.9	recommend ways for safer disposal of radioactive waste.			*

FOR EXAMINATION IN MAY 2021 AND ONWARDS

[4] CA = Classroom Activity, not to be assessed under examination conditions

Part II (Grade X)

Topics and Subtopics		Student Learning Outcomes		Cognitive Level		
				K	U	A
7. Biodiversity		Students should be able to:				
7.1	Biodiversity and Its Types	7.1.1	define the term, 'biodiversity';	*		
		7.1.2	describe the following types of biodiversity: a. genetic diversity b. species diversity c. ecosystem diversity;		*	
7.2	Importance of Biodiversity	7.2.1	explain the benefits that human beings gain from different species;		*	
		7.2.2	discuss the importance of biodiversity in food production, agriculture, medicine, ecology, aesthetics and culture;		*	
7.3	International Union for Conservation of Nature (IUCN) Red List	7.3.1	describe the recommended criteria of International Union for Conservation of Nature (IUCN) Red List to declare species as threatened, endangered or extinct;		*	
		7.3.2	identify the animal and plant species referred to as threatened, endangered and extinct in Pakistan;		*	
		7.3.3	identify on the map the protected areas of Pakistan that are recognised by IUCN;		*	
7.4	Causes of the Loss of Biodiversity	7.4.1	explain the causes (habitat destruction, pollution, hunting, poaching climate change and introduction of Alien species) of the loss of biodiversity globally as well as in Pakistan;		*	
7.5	Conservation of Biodiversity	7.5.1	define the term, 'conservation';	*		
		7.5.2	explain the need for conservation of biodiversity;		*	
		7.5.3	describe methods of conservation of biodiversity;		*	
		7.5.4	suggest measures that people in a community can take to reduce threats to biodiversity;			*

FOR EXAMINATION IN MAY 2022 AND ONWARDS

Topics and Subtopics	Student Learning Outcomes		Cognitive Level		
			K	U	A
	Students should be able to:				
	7.5.5	describe the measures taken by World Wildlife Fund (WWF), International Union for Conservation of Nature (IUCN), Government departments, and Civil Society Organisations (CSOs) for the conservation of biodiversity.		*	

FOR EXAMINATION IN MAY 2022 AND ONWARDS

Topics and Subtopics		Student Learning Outcomes		Cognitive Level		
				K	U	A
8. Social Change in Behaviour Patterns in Relation to Environment		Students should be able to:				
8.1	Social Behaviour and Social Change	8.1.1	define the terms, 'social behaviour' and 'social change';	*		
		8.1.2	suggest ways to bring about a change in behaviour patterns in relation to environment;			*
8.2	Change in Consumption Patterns from Simple Living to Comforts/ Luxuries	8.2.1	describe the changes in consumption patterns from simple living to luxury food habits, housing, transportation, automation and energy consumption;		*	
		8.2.2	discuss the effects of changes in lifestyles on natural resource;		*	
		8.2.3	prepare a newsletter on the local environmental issues by collecting information from a variety of sources, such as community surveys, newspapers, e-papers, etc;			CA
8.3	Change in Production Patterns from Simple to Complex (Automation and Use of Machines)	8.3.1	describe the patterns of production and consumption;		*	
		8.3.2	analyse the effect of changes in patterns of production and consumption on the environment;			*
		8.3.3	create a waste reduction plan to keep a record of how much refuse they generate in a week and separate their trash into paper, glass, plastic, and metals;			CA
		8.3.4	suggest ways to reduce waste at home and in school.			*

FOR EXAMINATION IN MAY 2022 AND ONWARDS

Topics and Sub-topics		Student Learning Outcomes		Cognitive Level		
				K	U	A
9. Resources Utilisation and its Impact on the Environment		Students should be able to:				
9.1	Natural Resources and Their Importance	9.1.1	define the term, 'natural resource';	*		
		9.1.2	mention the natural resources of Pakistan;	*		
		9.1.3	differentiate between renewable and non-renewable resources;		*	
		9.1.4	describe the importance of natural resources;		*	
9.2	Utilisation of Energy Resources and Their Impacts	9.2.1	estimate the consumption of energy, water and paper in school and at home;			CA
		9.2.2	explain the daily (including peak hours) and seasonal variations in the demand for electrical power;		*	
		9.2.3	discuss the impacts of using different energy resources (fossil fuels, hydroelectric, wind, solar and nuclear energy) on the environment;		*	
9.3	Safer Sources of Energy- Hydroelectric, Wind and Solar	9.3.1	describe the socio-economic development by using hydroelectric, wind and solar energy;		*	
9.4	Mineral Resources − Impact on Environment during Exploration, Treatment and Use	9.4.1	explain the availability, utilisation and limitations of different mineral resources;		*	
		9.4.2	discuss the existing mining practices and their impact on the environment;		*	
		9.4.3	describe how the modern mineral processing techniques promote more efficient and sustainable use of natural resources;		*	
9.5	Resources Management Practices	9.5.1	compare the energy efficiency of old versus new electrical appliances;		*	
		9.5.2	explain resource management functions to conserve energy resources such as electricity, oil, gas and coal at individual level;		*	
		9.5.3	suggest ways through which a community can conserve energy and mineral resources.			*

FOR EXAMINATION IN MAY 2022 AND ONWARDS

Topics and Sub-topics		Student Learning Outcomes		Cognitive Level		
				K	U	A
10 Environment and Quality of Life		Students should be able to:				
10.1	Indicators of Quality of Life	10.1.1	explain the following indicators of quality of life in relation to the environment: a. food b. drinking water c. health d. education e. housing f. sanitation g. energy h. transport;		*	
10.2	Socio-Economic Impacts with Reference to Human Intervention	10.2.1	explain the socio-economic impacts of human intervention on productivity and loss of employment in deforested, waterlogged and saline areas;		*	
		10.2.2	describe the change in socio-cultural values in promoting the awareness for healthy environment;		*	
		10.2.3	suggest ways to create awareness for various environmental issues;			*
10.3	Gender Equity, Literacy and Environment	10.3.1	discuss the gender differences present in the indicators of quality of life in relation to the environment;		*	
		10.3.2	describe the religious, ethical and cultural importance of environment;		*	
		10.3.3	suggest ways to enhance awareness for healthy environment among illiterate people.			*

FOR EXAMINATION IN MAY 2022 AND ONWARDS

Topics and Subtopics		Student Learning Outcomes		Cognitive Level		
				K	U	A
11. Global and Regional Environmental Issues		Students should be able to:				
11.1	Deforestation, its Causes and Consequences	11.1.1	define the term, 'deforestation';	*		
		11.1.2	discuss the causes of deforestation;		*	
		11.1.3	analyse the problem of deforestation in Pakistan with reference to different localities;			*
		11.1.4	explain the consequences of deforestation;		*	
		11.1.5	discuss the endangered mangrove and pine forests in Pakistan;		*	
11.2	Reforestation – Method for Replenishing Forest	11.2.1	differentiate between reforestation and afforestation;		*	
		11.2.2	discuss reforestation and afforestation as methods of replenishing forests;		*	
		11.2.3	suggest measures for the protection of Juniper forests in Balochistan;			*
		11.2.4	describe the important features of Changa Manga and Galiyat forests;		*	
11.3	Desertification, its Causes, Consequences and Control Measures	11.3.1	define the term, 'desertification';	*		
		11.3.2	describe the sources which directly or indirectly become the cause of desertification;		*	
		11.3.3	explain the short-term and long-term impacts of desertification;		*	
		11.3.4	identify the areas in Pakistan where desertification is expanding;		*	
		11.3.5	suggest ways to cope with the threat of desertification;			*
11.4	Urbanisation, its Causes and Consequences	11.4.1	define the term, 'urbanisation';	*		
		11.4.2	discuss the causes of urbanisation at national and global levels;		*	
		11.4.3	relate the consequences of faster urbanisation with environmental degradation;		*	
		11.4.4	explain socio-economic and socio-cultural health problems associated with increasing urban population;		*	

FOR EXAMINATION IN MAY 2022 AND ONWARDS

Topics and Sub-topics		Student Learning Outcomes		Cognitive Level		
				K	U	A
		Students should be able to:				
11.5	Greenhouse Effect and Global Warming, its Causes, Consequences and Control Measures	11.5.1	define the term, 'greenhouse effect';	*		
		11.5.2	relate greenhouse effect with global warming;		*	
		11.5.3	draw a concept map that demonstrates the interrelation among energy use, human activities and greenhouse gases;			*
		11.5.4	describe the factors responsible for heat-trapping effect of carbon dioxide in atmosphere;		*	
		11.5.5	describe the probable impacts of global warming on the environment, atmosphere, oceans and biota;		*	
		11.5.6	discuss measures that have been taken to reduce greenhouse gases;		*	
		11.5.7	suggest ways to mitigate the effect of global warming and greenhouse effect;			*
11.6	Acid Rain, its Causes, Consequences and Control Measures	11.6.1	define acid rain;	*		
		11.6.2	describe the formation of acid rain;		*	
		11.6.3	describe the effects of acid rain on the following: a. aquatic and terrestrial ecosystems b. statues and monuments;		*	
		11.6.4	suggest methods to reduce acid-forming emission;			*
11.7	Wetlands and Oceans, its Causes, Consequences and Control Measures	11.7.1	define wetlands;	*		
		11.7.2	explain the importance of wetlands for biodiversity;		*	
		11.7.3	describe the factors responsible for damaging wetlands and oceans;		*	
		11.7.4	explain the importance of protecting the marine life;		*	
		11.7.5	discuss the major initiatives taken by international community to protect the wetlands;		*	

FOR EXAMINATION IN MAY 2022 AND ONWARDS

Topics and Sub-topics		Student Learning Outcomes		Cognitive Level		
				K	U	A
		Students should be able to:				
11.8	Ozone Layer Depletion, its Causes, Consequences and Control Measures	11.8.1	define ozone layer;	*		
		11.8.2	explain the formation and breakdown of ozone in the stratosphere;		*	
		11.8.3	describe the importance of the ozone layer for Earth;		*	
		11.8.4	mention the sources of chlorine entering the stratosphere;	*		
		11.8.5	discuss the effects of ozone layer depletion on health and the environment;		*	
		11.8.6	suggest ways to cope with depletion of the ozone layer;			*
		11.8.7	describe some of the major initiatives taken by international organisations to protect the ozone layer.		*	

FOR EXAMINATION IN MAY 2022 AND ONWARDS

Topics and Sub-topics		Student Learning Outcomes		Cognitive Level		
				K	U	A
12. Environmental Management		Students should be able to:				
12.1	Sustainability of the Environment	12.1.1	relate the environmental management to sustainable development (wise use of resources, efficient resource utilisation, reuse and recycling);		*	
		12.1.2	describe the role of modern technologies used for environmental protection;		*	
		12.1.3	discuss the five "Rs" (refuse, reduce, recycle, reuse and rethink) for better environmental management;		*	
12.2	Environmental Ethics	12.2.1	define the term, 'environmental ethics';	*		
		12.2.2	discuss Islamic teachings about our moral obligations to leave the environment in good conditions for our next generation;		*	
		12.2.3	discuss the valuable aspects of the environment with reference to the benefits they provide to individuals;		*	
		12.2.4	explain the need for placing a value on some aspects, including living things of our environment;		*	
		12.2.5	relate appreciation of the beauty of nature with environmental ethics;		*	
12.3	Scientific Processes to Assess Environmental Threats	12.3.1	define the following: a. Environmental Impact Assessment (EIA) b. Environmental Risk Assessment (ERA) c. Environmental Impact Statement (EIS)	*		
		12.3.2	differentiate between EIA and EIS;		*	
		12.3.3	discuss different stages of EIA;		*	
		12.3.4	discuss ways by which the personal biases may be minimised and objectively maximised in EIA;		*	

FOR EXAMINATION IN MAY 2022 AND ONWARDS

Topics and Sub-topics		Student Learning Outcomes		Cognitive Level		
				K	U	A
		Students should be able to:				
12.4	Policies, Legislation, and Regulatory Mechanisms	12.4.1	describe the history of development of policies with reference to the environment at national and international levels;		*	
		12.4.2	describe the various policies effective for promoting healthy environment and the role of individual in policy making for solving environmental problems at local level;		*	
		12.4.3	list the salient features of Pakistan Environmental Protection Law of 1997;	*		
12.5	Civic Responsibilities of Individuals, Communities, CSOs, and Government Organisations	12.5.1	state the responsibilities of government agencies, community/ CSOs for monitoring and protecting the environment at local, state and national levels;	*		
		12.5.2	discuss the rights and responsibilities of a citizen in maintaining a healthy environment;		*	
		12.5.3	describe the role of education in environmental management;		*	
		12.5.4	discuss ways to cultivate and nurture civic culture and values in maintaining a healthy environment;		*	
		12.5.5	create a personal conservation plan and evaluate its implementation at home.			*

FOR EXAMINATION IN MAY 2022 AND ONWARDS

Summary of Student Learning Outcomes (SLOs)

Grade IX

Table 1: Number of Student Learning Outcomes by Cognitive level

Topic No.	Topic	No. of Sub-Topics	SLOs			Total SLOs
			K	U	A	
1.	Fundamentals of Environmental Studies	2	2	4	0	6
2.	Our Planet – Earth	5	4	14	1	19
3.	Ecosystem	7	4	12	4	20
4.	Population Growth, Development and Environment	5	3	14	3	20
5.	Air, Water and Land Pollution	4	1	19	6	26
6.	Noise and Radiation Pollution	2	2	7	4	13
	Total	**25**	**16**	**70**	**18**	**104**
	Percentage		**15**	**67**	**17**	**100**

Grade X

Table 2: Number of Student Learning Outcomes by Cognitive level

Topic No.	Topic	No. of Sub-Topics	SLOs			Total SLOs
			K	U	A	
7.	Biodiversity	5	2	10	1	13
8.	Social Change in Behaviour Patterns in Relation to Environment	3	1	3	3	7
9.	Resources Utilisation and Its Impact on Environment	5	2	10	1	13
10.	Environment and Quality of Life	3	0	5	2	7
11.	Global and Regional Environmental Issues	8	8	26	7	41
12.	Environmental Management	5	4	15	1	20
	Total	**29**	**17**	**69**	**15**	**101**
	Percentage		**17**	**68**	**15**	**100**

FOR EXAMINATION IN MAY 2021 AND ONWARDS
FOR EXAMINATION IN MAY 2022 AND ONWARDS

Scheme of Assessment

Grade IX

Table 3: Exam Specification

Topic No.	Topic	Marks Distribution	Total Marks
1.	Fundamentals of Environmental Studies	MCQs 12 @ 1 Mark CRQs 4 @ 4 Marks *ERQ 1 @ 5 Marks Choose any ONE from TWO	33
2.	Our Planet – Earth		
4.	Population Growth, Development and Environment		
3.	Ecosystem	MCQs 8 @ 1 Mark CRQ 1 @ 4 Marks *ERQ 1 @ 5 Marks Choose any ONE from TWO	17
5.	Air, Water and Land Pollution	MCQs 10 @ 1 Mark CRQs 2 @ 3 Marks CRQ 1 @ 4 Marks *ERQ 1 @ 5 Marks Choose any ONE from TWO	25
6.	Noise and Radiation Pollution		
	Total	**MCQs 30 CRQs 30 ERQs 15**	**75**

FOR EXAMINATION IN MAY 2019 AND ONWARDS

* Extended response questions (ERQs) will require answers in more descriptive form. The answers will be in a paragraph form rather than a word or a single sentence.

Grade X

Table 4: Exam Specification

Topic No.	Topic	Marks Distribution	Total Marks
9.	Resources Utilisation and its Impact on Environment	MCQs 7 @ 1 Mark CRQ 1 @ 3 Marks CRQs 2 @ 4 Marks *ERQ 1 @ 5 Marks Choose any ONE from TWO	23
10.	Environment and Quality of Life		
11.	Global and Regional Environmental Issues	MCQs 15 @ 1 Mark CRQ 1 @ 4 Marks *ERQ 1 @ 5 Marks Choose any ONE from TWO	24
8.	Social Change in Behaviour Patterns in Relation to Environment	MCQs 8 @ 1 Mark CRQ 3 @ 4 Marks CRQ 1 @ 3 Marks *ERQ 1 @ 5 Marks Choose any ONE from TWO	28
7.	Biodiversity		
12.	Environmental Management		
	Total	**MCQS 30** **CRQs 30** **ERQs 15**	**75**

FOR EXAMINATION IN MAY 2022 AND ONWARDS

* Extended response questions (ERQs) will require answers in more descriptive form. The answers will be in a paragraph form rather than a word or a single sentence.

- Tables 1 and 2 indicate the number and nature of SLOs in each topic in grades IX and X respectively. This will serve as a guide in the construction of the examination paper. It also indicates that more emphasis has been given to the Understanding (67% in IX and 68% in X), Application and higher order skills (17% in IX and 15% in X) to discourage rote memorization. Tables 1 and 3, however, do not translate directly into marks.
- There will be two examinations, one at the end of grade IX and one at the end of grade X.
- In each grade, the theory paper will be in two parts: paper I and paper II. Both papers will be of duration of 3 hours.
- Paper I theory will consist of 30 compulsory, multiple choice items. These questions will involve four response options.
- Paper II theory will carry 45 marks and consist of a number of compulsory, constructed response questions and a number of extended response questions. Each extended response question will be presented in an 'either/ or' form.
- All constructed response questions will be in a booklet which will also serve as an answer script.

Acknowledgements

Aga Khan University Examination Board (AKU-EB) would like to acknowledge the contributions of all those who played an important part in the revision of the AKU-EB SSC Environmental Studies syllabus.

We would like to thank **Afreen Kanwal**, **Lead Specialist**, AKU-EB, for taking the subject **lead** and **Uroosa Aslam**, **Specialist**, AKU-EB, for taking the **co-lead** for the revision of the SSC **Environmental Studies** syllabus. We are particularly thankful to the **syllabus revision panel** for their time, commitment and effort in revising the syllabus. The panel included:

- **Dr Umair Bin Zamir**
  Lecturer-Sindh Education & Literacy Department, Karachi

- **Saba Gul**
  BVS Parsi High School, Karachi

- **Sabeen Ahmed**
  Habib Girls School, Karachi

- **Farah Asif**
  M.Phil. Student of Environmental Studies, University of Karachi, Karachi

We also thank the following **post-revision reviewers** for their feedback on relevance of the content, skills and resources of the syllabus:

- **Dr Zafar Iqbal Shams**
  Assistant Professor, Institute of Environmental Studies, University of Karachi, Karachi

Furthermore, we thank **External Reviewer**, **institution** for reviewing the syllabus for **higher education preparedness**, ensuring that the syllabus includes adequate skills and content to effectively prepare students for the next level of education.

- **Dr Waqar Ahmed**
  Assistant Professor, Institute of Environmental Studies, University of Karachi, Karachi

In-house Team

- **Final Reviewer and Advisor: Dr Shehzad Jeeva**
  Director, AKU-EB
- **Mentor and Guide for Syllabi Review: Dr Naveed Yousuf**
  Associate Director, Assessment
- **Syllabi Review Lead: Raabia Hirani,**
  Manager, Curriculum Development
- **Syllabi Review Facilitator: Banazeer Yaqoob**
  Associate, Curriculum Development
- **Syllabi Review Facilitator and Language Reviewer: Farah Naz Ata**
  Associate, Curriculum Development
- **Internal Reviewer: Zain ul Muluk**
  Manager, Examination Development
- **Administrative Support: Hanif Shariff**
  Associate Director, Operations
  Raheel Sadruddin
  Assistant Manager, Administration
- **Syllabi Feedback Data Analysts: Tooba Farooqui, Muhammad Faheem** and **Muhammad Kashif**
  Lead Specialist and Specialists, Assessment
- **Design Support: Hatim Yousuf**
  Associate, Communications

We would like to thank the students and teachers of affiliated schools from across Pakistan who gave their valuable feedback at various stages of the review process.

We are grateful to **Sania Iqbal Siddiqui, Specialist,** AKU-EB, for her contributions to the write-up of the Subject Rationale. We also thank **Shahid Arwani**, **Assistant,** AKU-EB, for data compilation and formatting.