

Environmental Science

Code No. 333

Introduction

Rapid growth of population coupled with increasing industrial development and all round increase in consumerism throughout the world are posing a serious threat to the environment. People in almost all nations of the world are becoming increasingly conscious of the danger of deteriorating environmental conditions. In view of the critical importance of the environmental issues, it is necessary to introduce Environmental Science as a full-fledged subject at the Senior Secondary level. Environmental Science deals with the relationships between environment and humans and draws upon physical sciences, biological sciences and social sciences.

Rationale

Humans have been concerned with environment since the beginning of civilization. Even our ancient scriptures have emphasized the virtues and values of environmental conservation. Now, it is even more critical than ever before for mankind to have a better understanding of environmental issues to promote sustainable development practices. Environmental science embraces problems related to conservation of natural resources, deforestation, loss of biodiversity, environmental pollution, deterioration of life support systems and issues like global warming, ozone depletion etc. All this and much more is dealt within the subject.

The course covers all the major components of the environment including natural resources, ecological principles and population dynamics, pollution, wildlife conservation, and impact of industrialization. In addition, it also addresses environment related socio-economic, cultural and ethical aspects, which are important to ensure a sustainable future for humans. The course also provides practical insight into environmental management to enable an appreciation of the issues related to sustainable livelihood and human welfare.

Objectives

After completing this course, the learner will be able to:

- trace the origin of earth and evolution of life, and appearance of human species;
- develop concerns for environmental problems;
- describe the ecological principles;
- harmonize environmental concerns with technological and socio-economic issues;
- develop respect for nature and living beings and to help maintain ecological balance;
- take active part in protecting and conserving the environment; and
- assume the responsibilities for change of society.

Scope and job opportunity

This field has a large number of opportunities for employment. Learners can go for higher studies, teaching and research work. **Learners can also join different** National Level Departments or Organizations such as industries (fertilizer plants, mines, refineries, textile mills}, social development, research, forest and wildlife management, NGOs, Pollution Control Boards. Public Institutions and Private Industries and Firms, Schools, Colleges, Universities and Ministry of Environment and Forests(MoEF) etc. They can join international organizations such as United Nations Environment Programme (UNEP), Inter-governmental Panel on Climate Change (IPCC) etc.

Eligibility conditions

Age:15 years

Qualification: 10th pass

Medium of instruction: Hindi, English, Urdu, Gujarati, Bengali and Odia

Duration of the course: 1 Year

Weightage

Theory: 80 Marks

Practical: 20 Marks

Tutor Marked Assignments (TMA): 20% Marks of theory

Scheme of studies: Theory (180 hours for core and 30 hours for optional), practical (30hours), TMA (self paced)

Scheme of evaluation: Theory paper 80 marks (3 hours), Practical 20 marks (3 hours), Internal Assessment (TMA) (20% of theory marks).

Pass criteria: 33% in each component.

Course content

S. No.	Modules/Topics	Duration (in hours)	Module Description (Theory)	Description of practicals	Weightage (marks)
1.	Module-I Environment through Ages 1. Origin of Earth	15	This module is intended to enable the learners to visualize the origin of earth and the	The purpose of teaching Environmental Science is not only to acquaint the learner with theoretical knowledge	05

	<p>and Evolution of Environment</p> <p>2. Human Society and environment</p> <p>3. Degradation of Natural Environment</p>		<p>development of conditions for support of life. This module contains one unit “Environment-Origin, Evolution of Environment and its use by Humans’. This module has three lessons.</p>	<p>but also to develop practical skills. Development of these skills leads to better understanding of the environment through hands-on experience and mutual reinforcement of theory and practice.</p> <p>Field exercises and laboratory work develop psychomotor skills.</p> <p>The present course involves field work, laboratory exercises and short innovative projects to exercise creative thinking and problem solving skills.</p> <p>The list of practical exercises to be carried by a student as part of this course on Environmental Science is as follows:</p> <ol style="list-style-type: none"> a. Field Studies (any three) b. Laboratory Exercise (Compulsory) c. Creative Activities (any two) 	
2.	<p>Module-II Ecological Concepts and Issues</p> <p>4. Principles of Ecology</p>	30	<p>This module aims to introduce the learner to the principles of ecology and functioning of nature. This</p>	<p>a. Field Studies</p> <ol style="list-style-type: none"> 1. Study a simple ecosystem (suggested habitats pond, river, estuarine, lake, 	12

	<p>5. Ecosystem</p> <p>6. Natural Ecosystem</p> <p>7. Human Modified Ecosystem</p>		<p>module also deals with natural as well as human modified ecosystems also. This module contains one unit “Principles of Ecology – Composition and Types of Ecosystems”. This module has four lessons.</p>	<p>grassland, forest, and desert) and describe the biotic and abiotic components of the ecosystem.</p> <p>2. Study of the effect of human interactions with the natural environment.</p> <p>b. Laboratory Exercise</p> <p>1. To study the effect of light intensity on the growth of plants</p> <p>c. Creative activities</p> <p>1. Set up an aquarium</p> <p>2. To prepare a list of plants and animals which are used as food for humans and to comment on their habit and habitat.</p>	
3.	<p>Module-III</p> <p>Human Impact on Environment</p> <p>8. Human Societies</p> <p>9. Deforestation</p>	20	<p>This module is designed to enable the learner to understand the varieties of problems that have arisen due to increasing human habitations in the form of cities. The module also covers the highly important aspects of deforestation, loss of biodiversity. This module contains</p>		07

			one unit “Human Settlements and their impact of Environment”. This module contains two lessons.		
4.	Module-IV Contemporary Environmental Issues 10. Pollution – Its Causes, Consequences and Prevention 11. Environment and Health 12. Disasters and their Management 13. National Environmental Issues 14. Global Environmental Issues	40	This module brings about awareness of the contemporary environmental issues related to natural and man-made problems. Major national and global environmental issues have been described in this module to familiarize the learner with environmental pollution and natural disasters. Environment related human health problems are also highlighted in this module. This module contains two units “Environmental Pollution and Natural Disasters” and “National and Global Environmental Issues” this modules has five lessns.	a. Field Studies 1. Describe the environmental problem of your locality and suggest their remedy. 2. Visit to different water bodies in your village/ locality and describe their uses and source of water pollution. If any b. Laboratory exercises 1. Study of water quality. 2. To estimate dust (particulate) deposition on the leaves of road side plants. c. Creative Activities 1. To describe: a) climate of an urban areas; b) yearly variation in suspended particulate matter in the same area.	15

5.	<p>Module-V</p> <p>Environmental Conservation</p> <p>15. Biodiversity Conservation</p> <p>16. Conservation of other Natural Resources</p> <p>17. Soil and Land Conservation</p> <p>18. Water and Energy Conservation</p>	35	<p>This module introduces the importance of and methods of conservation of biodiversity, land, soil, water, energy and natural resources. This module contains one unit “Conservation of Biodiversity and Other Natural Resources (Soil, Water etc.). This module contains four lessons.</p>	<p>a. Field Studies</p> <ol style="list-style-type: none"> 1. Survey of vegetation, birds, insects and other animals in your locality. 2. Choose five common tree species plants from your neighbourhood and list their common names. Describe each plant in terms of its height and leaf characteristics. <p>b. Laboratory exercises</p> <ol style="list-style-type: none"> 1. Soil texture and analysis of components. <p>c. Creative Activities</p> <ol style="list-style-type: none"> 1. To study the biodiversity birds and insects in your locality. 2. Make herbarium sheets of 10 different plants/ trees. Consult your teacher how to make a herbarium sheet. 3. To make an audit of the electrical energy consumption by various house hold appliances of your home. 	14
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6.	<p>Module- VI Sustainable Development</p> <p>19. Concept of Sustainable Development</p> <p>20. Modern Agriculture</p> <p>21. Concept of Sustainable Agriculture</p> <p>22. Cleaner Technology</p>	40	<p>This module aims to inform the learner about the concept of sustainable development for integrating environmental conservation with Developmental objectives. This module elaborates the concept of sustainable agriculture including crop rotation, genetic control, organic agriculture, integrated pest management and cleaner technology. This module contains one unit “Sustainable Development with regard to Agriculture and Cleaner Technology”. This module contains four lessons.</p>	<p>a. Field Studies</p> <p>1. To segregate domestic solid waste into biodegradable and non-biodegradable components.</p>	07
7.	<p>Module- VII Environmental Management</p> <p>23. Environmental Legislation</p> <p>24. Environmental Impact Assessment</p>	20	<p>This module aims to inform learner about the concept of environment impact assessment and its relevance for promoting environ-friendly</p>		08

	<p>(EIA)</p> <p>25. Environment related Institutions and Organizations</p> <p>26. Environmental Ethics and Gandhian Approach</p>		<p>development. The learner will also be introduced to various national and international legislation promulgated for environmental improvement and conservation. This module also highlights the need to respect all life forms, ethics and Gandhian approach towards environment conservation. This module contains three units “Legislations for Environmental Improvement and Conservation”, “Organisation related to Environment” and “Environmental Ethics and Gandhian Approach”. This module contains four lessons.</p>		
8.	<p>Module-VIII A*</p> <p>Water Resource Management</p> <p>27. Global Circulation of Water</p> <p>28. Ground Water</p>	30	<p>Fresh water is a costly commodity required not only by humans but also by other living beings. A good deal of fresh water is also required for</p>		12

	<p>Resources</p> <p>29. Fresh Water Resources and Distribution</p> <p>30. Methods of Water Harvesting</p> <p>31. Conservation at Different Levels</p>		<p>agricultural and industrial uses.</p> <p>The hard fact is that the fresh water resources are limited thereby warranting careful management of fresh water resources by avoiding wastage. Emphasis of this module is on fresh water management including ground water resource. Steps to be taken by individuals and communities are highlighted not only to conserve fresh water but also to prevent its wastage and pollution.</p> <p>The learner is also told about the traditional as well as modern methods of water conservation. This module contains two unit “Water as Resource” and “Conservation of Water”. This module contains five lessons.</p>		
	<p>Module-VIII B*</p> <p>Energy and Environment</p>	<p>30</p>	<p>This module exposes the learner to the vital</p>		<p>12</p>

	<p>27. Importance of Energy in Society</p> <p>28. Non-renewable Sources of Energy</p> <p>29. Renewable Sources of Energy–1</p> <p>30. Renewable Sources of Energy –2</p> <p>31. Energy Conservation</p>		<p>area of energy and both its renewable and non-renewable sources. The learner is also exposed to the concept of alternative sources of energy apart from the traditional ones.</p> <p>The learner is also told about the impact of energy use on environment. A good deal of emphasis is laid on the need and methods of conservation of energy. This module contains two units “Energy use and its impact on Environment’ and “Energy Conservation”. This module contains five lessons.</p>		
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***Note: Learner has to choose one Module from VIII A or VIII B**