

ENVIRONMENTAL EDUCATION (49)

Aims:

1. To develop an understanding of eco-systems and their interrelations.
2. To develop an awareness about the utilization, overexploitation of natural resources.
3. To recognize the need for keeping pollution under control in order to maintain the quality of life.
4. To develop the ability to identify, analyse and reflect upon different environmental concerns.
5. To acquire skills to collect, analyze and interpret data and information relating to environmental problems.
6. To develop skills for effectively tackling problems related to the local environment.
7. To adopt practices that help in promoting balance in nature by making judicious utilization of resources and materials.
8. To acquire leadership qualities through participation in specifically designed activities.
9. To develop love, affection, sensitivity and a sense of responsibility towards all living beings.
10. To participate in activities and programmes for protecting, preserving and conserving the environment and its resources.
11. To appreciate and respect legal provisions for protection of animals and plants.
12. To imbibe the essence of environmental values and ethics in order to live in harmony with nature.

CLASS IX

There will be one paper of two hours duration carrying 80 marks and Internal Assessment of 20 marks.

The theory paper will have two sections:

Section A (Compulsory) will contain short answer questions covering the entire syllabus.

Section B will consist of questions, which will require detailed answers. There will be a choice of questions in this section.

THEORY – 80 Marks

1. Understanding Ecosystem

- (a) Types of ecosystem - forest, grassland, desert, aquatic, coastal, marine.

An understanding of environment and ecosystems- basic definitions of the two.

Terrestrial ecosystems like forest, grassland and desert – general climate, type of flora and fauna of each.

Aquatic ecosystems like marshes, swamps, ponds, lakes, rivers, estuaries, marine – general climate, type of flora and fauna of each.

- (b) Interaction between biotic and abiotic factors.

Biotic component consisting of producers,

consumers, decomposers.

Abiotic or nonliving components such as air, soil, water and climatic factors like sunlight, temperature, humidity and wind.

- (c) Energy flow and its importance, cycles of nutrients in terrestrial and aquatic (fresh water and marine) ecosystems, nature's mechanism in maintaining balance.

Understanding flow of energy as linear and nutrient flow as cyclic. Flow of energy to be explained by linking with the laws of thermodynamics - 'Energy is neither created, nor destroyed' and 'No energy transfer is 100% efficient'. Concept of circulation of nutrients within an ecosystem.

- (d) Destruction of ecosystem due to changing patterns of land use; factors responsible for this - population growth, migration, industrialization and urbanization, dwelling units, transport, encroachment on water bodies, forests and agricultural land, shifting cultivation, facilities for tourism, pilgrimage, recreation and adventure; construction of large dams, war and mining.

Encroachment on forests and other ecosystems. Pressure on forests due

to mining, logging, increased demand for agricultural land, construction of dams, pressure due to tourism, pilgrimage, etc. Pressure on natural resources due to population growth, urbanisation, industrialization, etc.

- (e) Impact of ecosystem destruction - loss of habitat, stress on resources.

Change in climatic conditions, reduced rainfall, drying up of rivers, depletion of aquifers, floods and droughts, loss of topsoil and desertification, loss of species, loss of biomass. Impact on agricultural practices.

- (f) Conservation of ecosystem - alternative practices including indigenous conservation practices, planning for proper land use.

Understanding indigenous conservation practices like those of Bishnois in Rajasthan.

- (g) Role of Environmental Impact Assessment (EIA) in maintaining the quality of the environment.

Meaning of EIA, aims and advantages of EIA, broad steps in EIA.

2. Depletion of Resources

- (a) Natural resources: - air, water, soil, metals, minerals, forests and fuels.

Importance of these resources in our daily life.

- (b) Causes of depletion of resources - over-use/irrational use, non-equitable distribution of resources, technological and industrial development, population growth.

Almost all activities of human society have degraded the environment physically, chemically, biologically and ethically.

Technological inputs have yielded high yielding varieties, which reduces the products of agricultural residue such as fodder, etc.; indiscriminate use of fertilizers and pesticides. Mining, industries, energy generation, automobiles, urbanisation leading to defacement of land, deforestation, deterioration of hydrological resources.

- (c) Impact of resource depletion

Imbalance in nature, shortage of materials, struggle for existence; slackening of economic growth.

Deforestation, desertification, loss of wild life, removal of top soil, exhaustion of ground water, depletion in the population of lions, elephants, tigers.

- (d) Practices for conservation of resources - search for alternatives, promotion of renewable resources.

Advantages and disadvantages of renewable resources when compared to non renewable resources. Study of the functioning of biogas, solar, wind and hydro power.

3. Waste generation and management

- (a) Sources of waste - domestic, industrial, agricultural, commercial and other establishments.

Domestic waste: paper, glass, plastic, rags, kitchen waste, etc.

Industrial: mining operations, cement factories, oil refineries, construction units.

Agricultural: plant remains, animal waste, processing waste.

Municipal: sewage, degradable and non-degradable waste from offices, etc.

- (b) Classification of waste - bio-degradable, non-biodegradable; toxic, non-toxic, bio-medical.

Bio degradable waste: paper, rags, vegetable peels.

Non-bio degradable waste: plastic, styrofoam, cans and glass.

Biomedical waste: needles, syringes, soiled dressings, pathological waste from hospitals, medical labs.

Toxic waste: radioactive waste, mercury, lead, DDT.

Non Toxic waste.

- (c) Impact of waste accumulation - spoilage of landscape, pollution, health hazards, effect on terrestrial, aquatic (fresh water and marine) life.

Self-explanatory.

- (d) Need for management of waste.

Self-explanatory.

- (e) Methods of safe disposal of waste - segregation, dumping, composting, drainage, treatment of effluents before discharge, incineration, use of scrubbers and electrostatic precipitators.

Segregation of domestic waste into biodegradable and non-biodegradable by households; sweeping from gardens to be converted to compost; sewage treatment plants, incinerators in group housings.

Scope and limitations of incinerators. Potential and limitation of equipment like ESP, scrubbers in industries.

- (f) Need for reducing, reusing and recycling waste.

Methods would involve governmental, social and individual initiatives.

Governmental initiatives: not building large dams for generating hydro electric power which leads to less land being submerged and less displacement of people. Improving efficiency of existing technologies and introducing new ecofriendly technologies.

Social initiatives: creating awareness and building trends of sensitive use of resources and products, e.g. reduced use of electricity, etc.

Individual: developing an ethical environmental consciousness e.g. refusing use of polybags, styrofoam containers, etc; reusing: plastic and glass containers; recycling: e.g. paper – this will reduce demand on wood and save trees.

- (g) Legal provisions for handling and management of waste.

Need for legal provisions.

Limitations of legal provisions for managing wastes.

4. Environmental Values and Ethics

- (a) Human rights, fundamental duties and value education.

Human rights, fundamental duties: self-explanatory.

The environmentally conscious may choose to carry cloth bags, use organic manure. Apart from one's own home, also make efforts to see that the surroundings are cleaned, e.g: the neighbourhood – plant more trees, respect for other people's things; this will evoke respect for their colony, city and country.

- (b) Women and Child Welfare.

Understanding the position of women in the urban and rural society and examining their role in evolving and protecting environmental values and ethics in the use of natural resources.

Perceiving the need to empower and include women in decision making regarding local environmental issues.

Ensuring safe spaces of learning and play for children.

Understanding the importance of women and child healthcare.

INTERNAL ASSESSMENT – 20 Marks

Students are required to complete one case study and one project from the list given.

The activities suggested below are neither exhaustive nor prescriptive. Teachers may design their own set of activities keeping in view the overall objectives of teaching and learning of Environmental Education at this stage. They will have to make use of local flora and fauna and the available resources and facilities and take cognizance of local environmental problems. The learners should be encouraged to initiate action on their own.

Suggested list of assignments

1. Visit a few establishments in the locality, such as motor repair workshops, kilns, pottery making units, fish and vegetable markets, restaurants, dyeing units. Find out the types of wastes and methods prevalent for their disposal. On the basis of the information collected, suggest measures to improve the environmental conditions.
2. Prepare a report on the changing patterns of land use during the last five years in the village, city, region and state through collection of information from different sources about the area of land

utilized for:

- housing,
 - markets, hospitals, schools and other facilities,
 - construction of roads, and
 - industries.
3. To identify economically and environmentally-friendly alternatives in order to deal with the scarcity of resources such as fuels in the locality.
 4. Visit a nearby hospital or health center and collect information about diseases caused due to the prevailing environmental conditions.
 5. Plan and execute awareness campaigns through community participation on major environmental problems at the local and/or national levels, like deforestation, energy conservation, air pollution due to automobiles and noise pollution.
 6. Disseminate information through bulletin boards/school magazines about the impact of construction of large dams, natural disasters like floods, droughts or cyclones on the ecosystem.
 7. List different types of industries in the States and collect information about the types of raw materials used, modes of their procurement and disposal of wastes generated. Classify these industries as polluting or environment friendly and suggest possible ways of reducing pollution caused by these units.

CLASS X

There will be one paper of two hours duration carrying 80 marks and Internal Assessment of 20 marks.

The theory paper will have **two** sections:

Section A (Compulsory) will contain short answer questions covering the entire syllabus.

Section B will consist of questions, which will require detailed answers. There will be a choice of questions in this section.

THEORY – 80 Marks

1. Restoring Balance in Ecosystem

- a) Need for adopting control measures to check for spoilage of landscape.

With population growth, increased consumption and urbanization, there is a need to keep a check on demands of urban areas over rural areas, of exploitative use of resources rather than sustainable use, dumping of waste by towns, cities, industries, etc.

- b) Need for conservation and management of water - integrated watershed management, recharging of ground water including rain water harvesting, development of appropriate technology.

Requirement of technology, both traditional and modern for management of water. Building johads (an earthen bund or check dam to conserve rainwater) from Rajasthan to Gujarat, Maharashtra, AP, Orissa, Karnataka.

Rainwater harvesting as Kunds in Rajasthan, Tankas in Gujarat, temple ponds of South India, to modern methods in urban cities.

Percolation pits, roof water harvesting.

- c) Conservation and management of forests, grasslands, semi-arid ecosystems.

Strategies and methods of their conservation-laws, awareness involvement of locals and technical methods.

- d) Conservation and management of ocean resources - marine and coastal eco-systems,

importance of coral reefs.

The role of oceans in the water cycle, supply of food, regulation of climate, important source of minerals, natural gas.

Coral reefs are important for their role in bio-diversity preservation and eco-tourism.

- e) Conservation and management of soil - alternate cropping, judicious use of inputs like water, fertilizers, pesticides; use of manure, bio-fertilizers and bio-pesticides; plantation and conservation of grasslands to check soil erosion; forest conservation including Joint Forest Management (JFM), afforestation including social forestry and agro-forestry.

Rotation of crops, phasing out of organic and chemical fertilizers; green manuring; compost, farm yard manure; eutrophication from use of excess chemical manure; bio fertilizers as alternatives which are eco friendly.

Danger of Pesticides, such as insecticides, fungicides, herbicides.

Use of bio-pesticides- biological pest control e.g. Neem.

Importance of social forestry and agro-forestry.

- f) Measures to conserve wild life - national parks, sanctuaries and bio-reserves; breeding programmes for endangered species; preventing poaching, hunting and bio-piracy; enforcement of legal provisions.

In situ and ex situ conservation methods – their advantages and disadvantages. Need for legal provisions for conserving wildlife.

- g) Application of bio-technology.

The controlled activity of micro-organisms helps in obtaining several beneficial products like alcohols, antibiotics, enzymes, vitamins, vaccines, plant growth promotes hormones like insulin.

Potential of bio-technology.

- (h) Relevance of indigenous practices, tribal culture and its linkages to forest resources and their conservation; sacred groves.

The wisdom of indigenous practices, the need to learn from them and sustain them wherever possible and applicable. The harmonious relationship between tribals and forests.

Importance of continuing local practices for resource management.

Understanding the utility of sacred groves.

(Sacred groves are tracts of forest set aside by people that a particular pocket has a resident god. This protected area would be rich in flora and fauna).

2. Pollution

- (a) Types of pollution - air, water (fresh and marine), soil, radiation and noise.

Self-explanatory

- (b) Sources of pollution and major pollutants; oil spills.

Air: vehicular, industrial, burning garbage, brick kilns, etc.

Water: household detergents, sewage, industrial waste, offshore oil drilling, thermal pollution.

Soil: industrial waste, urban-commercial and domestic waste, chemical fertilizers, bio medical waste and pesticides.

Radiation: X- rays; radioactive fallout from nuclear plants.

- (c) Effects of pollution on - environment, human health and other organisms.

Bhopal Gas Tragedy; Chernobyl Disaster.

- (d) Abatement of pollution.

Air: setting standards and implementing them, using technical devices to reduce pollution.

Water: proper collection and disposal of domestic sewage, treatment of industrial waste to yield safe effluents, etc.

Nuclear: working on safe disposal of waste. Safety measures to be strictly enforced.

3. Issues of the Environment

- (a) Decline in forest, agricultural and marine productivity and its effects on the economy.

Unprecedented growth in human population has put enormous pressure on biodiversity. Greater demands for food and land, excessive

consumption of minerals and other non-renewable resources have affected economic growth.

- (b) Resettlement and rehabilitation of people.

Self-explanatory.

- (c) Energy crisis - urban and rural sectors.

Renewable energy: biogas, solar energy, wind energy, energy from falling water, run-of-the river schemes, energy from waste, tidal energy, etc. Issues of economic viability and ability to meet demands.

Non-renewable energy – coal, oil, natural gas. Inequitable use of energy in urban and rural areas. Urban areas use a lot of non-renewable energy. Rural areas use hydro electrical power for light, tube wells. Biomass (wood, animal and crop wastes) as fuel. Human and animal muscle power for transportation, ploughing, threshing, lifting water for irrigation, etc.

- (d) Greenhouse effect and global warming.

Meaning and impact on life on earth; projections for the future; what needs to be done.

- (e) Acid Rain.

Meaning of Acid rain. Its impact on crops and buildings.

- (f) Climatic changes.

Climatic changes due to human activities such as burning fossil fuels, deforestation, greenhouse effect will lead to increase in the heat waves, drought, floods, intense storms, melting of ice caps, shifting of ocean currents, impact on agriculture, loss of ecosystems and biodiversity (brief discussion only).

- (g) Ozone layer depletion.

Cause and effect.

- (h) Disaster – natural and manmade; disaster management and its mitigation.

Strategies and plans for mitigating and managing natural and man made disasters.

4. Striving for a Better Environment

- (a) Use of efficient and eco-friendly technology and the sustainable use of resources.

Eco efficiency would mean reduction in the amount of raw material used, reduction in the amount of energy used, reducing pollution, recycling material, using renewable materials and ensuring that goods are durable.

Judicious use of resources keeping the future in mind.

- (b) Consumer education - consumer rights, making correct choices while buying different items; food adulteration.

Understanding the importance of educating consumers of their rights - awareness of food adulteration and its harmful effects.

- (c) Community participation and public awareness programmes for ecological restoration and conservation.

Studying successful models of community participation like Ralegaon Siddhi, Sukhomajri, The Chipko Andolan (Movement), Beej Bachao Andolan (Save the Seeds Movement) in Jardhargaon in Tehri Garhwal district of Uttranchal, use of CNG (brief idea only).

Significant achievements by pooling resources, skills, knowledge and working in unison.

Understanding processes of involving communities in conservation work.

- (d) Protection of wild life; cruelty to animals.

Prevention of Cruelty to Animals Act; Wildlife Protection Act; CITES [Convention Against International Trade in Endangered Species].

- (e) Enforcement of acts, laws and policies.

Understanding the role of citizens in enforcing laws, eg. informing concerned authorities (the need to know whom to inform).

INTERNAL ASSESSMENT – 20 Marks

Students are required to complete one case study and one project from the list given

The activities suggested below are neither exhaustive nor prescriptive. Teachers may design their own set of activities keeping in view the overall objectives of

teaching and learning of Environmental Education at this stage. They will have to make use of local flora and fauna and the available resources and facilities and take cognizance of local environmental problems. The learners should be encouraged to initiate action on their own.

Suggested list of assignments

1. Organize a discussion/ debate on issues of environment, such as pollution of air, water and soil, depletion of resources, disposal of plastics and urbanization.
2. Collect data from owners/drivers of private/commercial vehicles through interview-cum-discussion method and prepare a report. Information may be sought on: -
 - frequency of checking air pressure;
 - maintenance of vehicles;
 - types of horns fitted in vehicles and frequency of their use;
 - frequency of pollution checking;
 - average driving hours per day;
 - state of driver's personal health.
3. Collect data from different households through interview-cum-discussion method. Discuss and suggest ways and means for saving electricity and fuels. Information may be collected on:
 - types and quantity of fuel used per month in the kitchen;
 - amount of electricity used per month or the fuel used for generator or any other sources used for lighting;
 - amount of fuel used per month in car, motor cycle, scooter, tractor;
 - measures/steps taken for saving fuel and electricity.
4. Find out the sources of pollution of water bodies in the locality and determine the quality of water.
5. Prepare plans for the beautification of the school campus or a park in the locality. Identify suitable plants and trees, undertake plantation and look after them. (This may be introduced as a class/group activity as a part of *van mahotsva* or eco-club programme.)

6. Visit a water treatment plant, sewage treatment plant or garbage dumping or vermi composting sites in the locality and study their working.
7. Collect information about global environmental issues and problems and communicate your findings through appropriate modes (like posters, charts, collages, cartoons, handouts, letters, street plays, etc. to all concerned.
8. Participate in eco-clubs and activities like debates, quizzes, exhibitions, essay competitions on the themes related to environmental concerns and problems. Synthesize information gathered from books, journals, magazines and internet.

EVALUATION

The project work is to be evaluated by the subject teacher and by an External Examiner. The External Examiner shall be nominated by the **Head of the school** and may be a teacher from the faculty, **but not teaching the subject in the relevant section/class**. For example, a teacher of Environmental Science of Class XI may be deputed to be the External Examiner for Class X Environmental Education project work.

The Internal Examiner and the External Examiner will assess the candidate's work independently.

Award of marks (20 marks)

Subject Teacher (Internal Examiner): 10 marks

External Examiner: 10 marks

The total marks obtained out of 20 are to be sent to the Council by the Head of the School.

The Head of the School will be responsible for the entry of marks on the mark sheets provided by the Council.

Teaching-Learning Strategies

Teaching-learning needs to be so designed that it facilitates enhancement and concretization of understanding, refinement of habits, attitudes, values and skills. Besides, linkages between theory and practice need to be strengthened. This would ensure learners' proactive role in addressing environment related problems. The strategies may involve the following:

- Providing opportunities for the application of knowledge gained and understanding acquired.
- Providing opportunities through simple projects to identify environmental problems which catch the student's attention.
- Encouraging independent handling of projects and activities.
- Providing opportunities for critically analyzing data and information collected on environmental issues.
- Encouraging nature study using the case study approach.
- Involving learners in surveys pertaining to environment related problems/ phenomena.
- Involving learners in community based environment improvement programmes.
- Arranging excursions and visits and preparing reports.
- Organizing brainstorming sessions to identify areas of action.
- Encouraging self-learning through hands-on experiences.
- Utilizing group activities for nurturing leadership qualities.

INTERNAL ASSESSMENT IN ENVIRONMENTAL EDUCATION - GUIDELINES FOR MARKING WITH GRADES

Criteria	Preparation	Investigation/Gathering Data	Analysis/Inference	Solutions Alternatives/ Innovations	Presentation
Grade I (4 marks)	Follows instructions with understanding; modifies if needed. Background information correct. Level of awareness high.	Is able to ask correct questions. Knows whom to ask, when and how. Can deal with more than one variable.	Analyses systematically. Can see sequences or correlation. Can segregate fact from opinion.	Innovative ideas presented. Alternatives suggested.	Accurate. Feasible, neat, well labelled diagrams. Index and references given.
Grade II (3 marks)	Follows instructions step-by-step. Awareness is good. Background information correct.	Is able to ask questions and identify whom to ask, when and how. Can handle two variables only.	Makes observations correctly. Analysis fair.	Alternatives presented. Innovative but not practical.	Accurate. Neat, well labelled diagrams. Index and references given.
Grade III (2 marks)	Follows simple instructions only. Awareness basic. Background information sketchy.	Needs help with the investigations. Has suggestions but cannot decide.	Observation - help needed. Needs guidance to see correlations or sequence.	Obvious solutions presented. Not innovative.	A bit disorganised, but neat and accurate. Either index or references missing.
Grade IV (1 mark)	Follows some instructions but confused. Has to be made aware. Background information incorrect in places.	Needs to be told what questions to be asked, whom to ask or where to gather the data from.	Detailed instructions required to draw inferences. Charts have to be made.	Thinks of solutions under guidance.	Poorly organised. Some points missing. Index and references missing.
Grade V (0 mark)	Confused about instructions. Has to be made aware. Needs help with background information.	Gets stuck at every step. Questionnaire has to be formulated.	Even with help, analysis is not clear. Takes teacher's word for it.	Solutions not forthcoming.	Overall impression very poor. Not very accurate.