ENVIRONMENTAL EDUCATION (802)

Aims:

The learner

- To develop an in-depth understanding of various environmental issues and concerns of national and global importance.
- To develop a balanced view of the relationship between environment and development.
- To understand basic concepts related to sustainable development vis-à-vis improvement of quality of life.
- To develop a deeper concern for the environment and a sense of commitment and responsibility to take proactive action.
- To appreciate the variety in living organisms and recognize India as a mega- diversity nation.
- To appreciate the role of the individual, community, national and international agencies in resolving environmental problems.
- To practice ways of bringing about qualitative improvement in the environment by assuming leadership role.
- To identify self with one's environment with an attitude to personally contribute towards its improvement.
- To respect customs and traditions related to local conservation practices and accept indigenous eco-friendly technologies.
- To develop skills to undertake and participate in investigative studies on various environmental issues; and
- To motivate others and participate in social and community activities in dealing with environmental problems.

CLASS XI

There will be two papers in the subject:

Paper I: *Theory – 3 hours ... 70 marks*

Paper II: *Practical/Project Work – ... 30 marks*

PAPER I - THEORY

There will be one paper of three hours duration carrying 70 marks.

The 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.*

1. Man and Environment

(i) Dimensions of environment - physical, biological and social.

Physical environment consisting of atmosphere, hydrosphere and lithosphere – importance of each.

Biological – plants and animals and their interdependence (producers, consumers, decomposers).

Social – populations, interaction in social hierarchies, territorialism and dominance.

(ii) Human being as a rational and social partner in environmental actions.

While human beings are responsible for the present state of the environment, they are also capable of acting intelligently and finding solutions (a general understanding of the above to be provided).

(iii) Society and environment in India; Indian traditions, customs and culture – past and present.

A brief look at some past traditions and customs which reflect a close understanding of nature and care for all living beings e.g. sacred groves, johads, eris [water tanks of South India], traditional fishermen not fishing in the spawning seasons, farmers-crops and growing season in complete harmony with the local environment and seasons, etc.

Present culture marked by rapid changing society and globalisation leading to demand on natural resources.

(iv) Population and environment.

Meaning of terminologies such as population, birth rate, death rate, population growth, carrying capacity, global distribution of population and resource use patterns. Increasing populations, destructive impact on environment – idea of ecological imbalance.

(v) Impact of human activities on environment:

- environmental problems of urban and rural areas.
- stress on civic amenities; supply of water and electricity, waste disposal, transport, health services.
- vehicular emissions.
- urbanization - land use, housing, migrating and floating population
- natural resources and their depletion.

Natural resources and their depletion to be studied with respect to land, water and air.

A close look at each of the above, with specific examples from the Indian context.

2. Environment and Development

(i) Economic and social needs - as basic considerations for development.

Concept of economic and social development; Economic - by the rise of per capita income, industrial and technology development; social – by education, health, sanitation, social services.

Factors affecting economic and social growth – a list only.

(ii) Agriculture and industry as major sectors of development.

Understanding the role of agriculture in economies – providing food security, adequate nutrition to the population, preserving biodiversity.

Understanding the role of agriculture in the economic development of India.

Role of industry in the overall growth of the country, the need to give importance to different kinds of industries e.g. cottage industry ensures that traditional artisan skills are not lost. It also provides employment to a number of people. Impact of industrial growth on agriculture – agribusiness.

(iii) Social factors affecting development - poverty, affluence, education, employment, child marriage and child labour; human health - HIV/AIDS, social cultural and ethical values.

Self-explanatory.

(iv) Impact of development on environment - changing pattern of land use; land reclamation, deforestation, resource depletion, pollution and environmental degradation.

Rural – forests being cut down for converting to farmland and cropland being used for urban settlements and industries.

Urban – small dwellings being converted into multi-storeyed complexes, parks and green belts being removed, municipal facilities becoming inadequate.

Reclamation of desert land, water logged land for forestry, vegetation, horticulture, rice cultivation, etc.

An understanding of how development is causing resource depletion, pollution and environmental degradation.

(v) Impact of liberalization and globalization on - agriculture and industries, dislocation of manpower and unemployment, implications for social harmony.

Understanding the concept of globalisation and liberalisation. The potential of globalisation and liberalisation.

The onus of agriculture shifting from farmers to companies selling seeds and chemicals.

Impact of multinational companies on small industries - closure of industries, unemployment, dislocation of workforce. Understanding the danger of creating a disparate / inequitable society.

(vi) Role of society in development and environment - public awareness through education, eco-clubs, population education programme, campaigns, public participation in decision-making.

To look at examples of places and issues where the above mentioned programmes have worked, examples like Chipko Movement, Appiko in Karnataka, Eco-clubs, etc.

3. Environmental pollution and Global Issues

(i) Air, water (fresh and marine), soil pollution - sources and consequences.

Looking at some important sources of pollution (vehicular, industrial and municipal) and serious consequences (carcinogens in the air, heavy metals in water, Persistent Organic Pollutants [POPS] in soil). Smog, acid rain, plastics in soil, DDT.

(ii) Noise and radiation pollution - sources and consequences.

Some major sources of noise like - construction sites (cutting of marble), generators in residential units/institutions, airports, industrial grinders. Effect of noise on people working in such places and on neighbouring communities.

Dangers of leakages of radiation, e.g. Chernobyl. Outcome of atomic bombs at Hiroshima and Nagasaki.

(iii) Solid, liquid and gaseous pollutants.

Looking at examples of some major pollutants under each category [e.g. PVC, detergents, oil spills, municipal waste, plastics, garbage, CO, SO_2, etc).

(iv) Handling of hazardous materials and processes; handling and management of hazardous wastes.

Understanding what hazardous materials are. Handling and management of hazardous waste by proper disposal.

(v) Ozone layer depletion and its effect.

Ozone Depleting Substances [ODS]; effect of depletion of the ozone layer. Montreal Protocol.

(vi) Greenhouse effect; global warming and climatic changes and their effects on human society, agriculture, plants and animals.

A brief understanding of the concept Greenhouse effect. Impact of global warming in terms of climatic changes, rise in sea levels, melting of ice caps, dramatic change in ice and permafrost in Arctic and Antarctic regions; impact on animals and plants due to climate changes. Mention of Kyoto Protocol (1997) for stabilising emission of GHG (Green House Gases).

(vii) Pollution related diseases.

A few major diseases caused by pollution - Minamata disease caused by mercury poisoning, heavy metal poisoning causing diseases like Parkinson's, pollutants in air causing respiratory disorders and lung cancer, Pesticides e.g. DDT causing problems in the reproductive system, nervous system, excretory system.

(viii) Disasters - natural (earthquakes, droughts, floods, cyclones, landslides) and manmade (technological and industrial): their impact on the environment: prevention, control and mitigation.

Natural disasters. Understanding that many natural disasters are caused by human action, e.g. dams causing earthquakes, deforestation leading to landslides and droughts; industrial – Bhopal disaster; technological – Chernobyl.

Understanding that natural and manmade disasters can be dealt with through appropriate processes of management.

(ix) Strategies for reducing pollution and improving the environment.

Strategies at individual, social and governmental levels.

A regular check of SPM (Suspended Particulate Matter); pollution control strategies such as use of low pollution fuels; setting up emission standards for factories and vehicles. Waste management and recycling of waste, reduction in waste production. Water – industrial effluents should be made harmless before discharge; recycle and recovery of waste; biological treatment of some effluents.

4. Energy

(i) Changing global patterns of energy consumption - from ancient to modern times.

Looking at varied sources and uses of energy over time: Ancient times - energy from fire for metal work [forging], glass work, cooking, etc., animal and human energy for transportation and other forms of work like drawing water from wells, etc. Post industrialization - increased importance of electrical energy, different sources of electrical energy; different applications - starting from specific uses like drawing water,

lighting, powering locomotives, power for industrial equipment, etc., to eventually, society being completely dependent on electric power for its functioning.

The above to be referred to briefly.

(ii) Energy consumption as measure of quality of life.

Use of diesel/ petrol in trains, buses, cars and other vehicles; use of LPG. Energy consumption as a measure of quality of life.

(iii) Rising demand for energy, gap between demand and supply (Indian context).

Industrial sectors being given priority in supply over agricultural sectors, cities being given priority over rural areas, etc.

(iv) Conventional energy sources - fossil fuels and firewood, potential (Indian context) and limitations of each source, methods of harnessing and environmental consequences of their use.

Conventional energy sources:

Firewood – for heating and cooking along with agricultural and animal waste.

Coal - thermal power - how much coal is left? What are the issues with thermal power? (global warming, thermal pollution in waters, fly ash, atmospheric pollution, etc.).

Petroleum - petrol, diesel, LPG; non-renewable, expensive.

(v) Non-conventional energy sources - types of non-conventional sources (bio-mass, solar, wind, ocean, hydel, geothermal, nuclear), potential (Indian context) and limitations of each source, methods of harnessing and their environmental consequences, need to promote non-conventional energy sources.

Advantages and limitations of each non-conventional energy source. Methods of harnessing these energy sources and their environmental consequences. Need to promote non-conventional energy sources.

(vi) Conservation of energy sources - efficiency in production, transportation and utilization of energy.

Understanding that with suitable selection and design of equipment and production processes, tremendous amounts of energy can be saved; tremendous amounts of energy gets lost in transportation due to use of outdated technology and also due to pilfering.

Methods of saving energy: in homes and institutions - use of energy saving bulbs, usage of solar cookers, heaters, biogas pipeline, etc; in transportation – use of car pools, public transport system.

(vii) Planning management of energy; future sources of energy - hydrogen, alcohol, fuel cells, biofuels.

Understanding ways of planning energy management - looking at a few real models. Current status and future potential. ***(only for the purpose of discussion and not for testing).***

(viii) Enhancing efficiency of the devices and optimizing energy utilization.

Understanding different ways of enhancing efficiency of the devices - energy saving devices like Compact Fluorescent Lamps, designing buildings that will make best use of natural light and suited to local climatic conditions, etc.

PAPER II – PRACTICAL/PROJECT WORK

Guidelines for Practical/Project Work are given at the end of this syllabus.