Environmental Applications Syllabus

There is one written paper of two hours duration carrying 100 marks and Internal Assessment of 100 marks. The paper has two Sections: Section A (Compulsory) contains short answer questions covering the entire syllabus. Section B consists of questions, which require detailed answers. There is a choice of questions in this section.

1. Introduction

To give a broad introduction to the current environmental problems. To highlight the magnitude of these problems and to learn to appreciate the complexity of the issues involved. This is to be done through

- presenting facts and statistics.
- inter-linking facts to generate a broad perspective.
- understanding frameworks and systems that contribute to the problem under study.

Our main environmental problems

(i) Understanding ecosystems - threats and conservation measures.

Major causes of ecosystem destruction. The extent of forest cover left in India and the world today. For instance, India is left with about 4.6% protected forest cover. The rate of destruction. Efforts being undertaken to save the forests. Names of some organisations which are involved and understanding of conservation measures. Examples of successful cases.

(ii) Resource depletion.

The consequences of major resources being depleted. Use of local and international examples. For example, petroleum products are likely to last only a few more decades.

(iii) Waste generation.

Issues of waste generation and disposal. A few prominent examples like dumping of nuclear waste and other hazardous wastes in developing countries by developed countries. Basel convention.

(iv) Economic disparities.

The extent of poverty in India and in the world. The nature of poverty in developed countries and developing countries - in rural and urban areas. Consequences and implications with reference to the lifestyles and aspirations of communities and society. Developmental paradigms and the politics of poverty.

(v) Land use.

Changing patterns of land use. Modern agriculture. Issues related to water.

2. Basic Ecology

To give a clear understanding of ecological concepts. The learning will be enhanced if live examples are used with as many outdoor classes as possible.

(i) Biotic and abiotic components of an ecosystem. Classification. Understanding role.

(ii) Food chains, food web and trophic levels. To understand the use of these tools as a means of understanding ecosystems.

(iii) Ecological niche, habitat and microhabitat. The criticality of the role of each species in an ecosystem. The difference between habitat and microhabitat.

(iv) Succession. How forests regenerate. Kinds of succession - primary and secondary.

(v) Ecotypes. The influence of external factors like climate and soil (micro habitat) on organisms.

(vi) Flow of energy through an ecosystem. Sun as the primary source of energy. Linear flow of energy versus cyclical flow of nutrients.

(vii) Concept of species. To understand the sovereignty of species. The importance of critical minimum size of species population.

(viii) Extinction of species. Effects of extinction.

(ix) Introduced species. The impact of introduced species on indigenous species and ecosystems - competition, habitat destruction, diseases etc., e.g. Acacia, Subabul, Lantana.

(x) Endemic species. Inter-relationship with other organisms, their evolution, the extreme adaptability to local environments.

(xi) Keystone species. Understanding that while all species have a niche, some species play a more critical role as they are keystone species, e.g. crocodile, sharks, fungi.

(xii) Kinds of ecosystems. Study a range of ecosystems, the life that they support, their uniqueness, etc.

3. Conservation of Ecosystems

(i) Conservation strategies:

- Species approach including CITES.
- Ecosystem approach including formation of National parks, sanctuaries and Biosphere reserves.
- Wildlife management.

What is the extent of forest cover left in the world? What are the threats faced by forests? What are the different kinds of strategies that are being used to conserve forests? The above three are broad examples. Students should be made aware of the scope and limitation of the above approaches. Study an example of each kind.

(ii) Value of bio-diversity.

Study the value of bio-diversity from different viewpoints - ecological, economic, health, food and aesthetic.

4. Dynamics of Development and Resource Use

Understanding development

(i) People as resources.

To gain an understanding that most development issues arise due to not recognising people as valuable resources. Importance of generating employment.

(ii) Impact of scale and kind of technology on resources.

Understanding the model of modern development and the impact of industrialising and automating on the economy, people and resources. Shortterm and long-term accounting. Depletion of resources. Resource scarcity and economic consequences.

(iii) Urbanisation and its impact.

Causes and consequences of rapid, unplanned urbanisation - impact on infrastructure, services and provision of basic amenities.

(iv) Ecological footprint of a city.

Study two sample cities to see the extent of ecological impact on surroundings and also the actual extent of resource supply to the city. Extent of waste generated in a city in a day. Ratio of biodegradable and non-biodegradable matter. The need to sort garbage. E.g. Chennai generates 3500 tons of garbage a day of which only 800 tons is non bio-degradable. Dumping of hazardous wastes particularly in developing countries. The Basel convention.

(v) Population (questioning Malthus, carrying capacity). Self-explanatory.

(vi) Poverty

Dynamics of urban and rural poverty, relationship to social structure - the dynamics of the decline of traditional opportunities and occupations.

5. Understanding Land use

(i) Agriculture.

(a) Traditional farming methods.

Study a few traditional methods of farming - region specific and crop specific. Management of commons. Farming as an activity of the whole community.

(b) Traditional varieties and their adaptability to local environments.

Study characteristics of a few sample crops drawn from different climatic and soil conditions.

(c) The impact of green revolution practices.

Study the impact of green revolution practices on soil, water, local crop varieties, food production, economy, small farmers and distribution using Punjab as an example; contribution to food security.

(d) Food scarcity in the midst of plenty.

To understand and analyse the distribution system.

(ii) Towards a world without hunger

(a) Introduction to new and old organic farming practices.

- Do nothing farming – Fukuoka.
- Bio-dynamic farming - Rudolph Steiner.
- Permaculture – Mollison.
- Integrated farming practices.
- Low Input Sustainable Agriculture (LISA).

Study the different farming practices - possibly through visits - if possible by growing crops on small patches of land.

(b) Assessment of Biotechnology.

Is biotechnology the answer to the various environmental issues around food production or is it yet another technological disaster waiting to happen.

(c) Global food security, food aid.

How to achieve food security? Is food aid the right answer? Is sustainable agriculture and subsistence farming the answer to the problem of food security - or is it necessary to achieve a judicious balance of the above with monocropping for building a national buffer of food grains.