ENVIRONMENTAL APPLICATIONS (89)

(Candidates offering Environmental Science are not eligible to offer Environmental Applications.)

Aims:

1. To acquire knowledge of the origin and functioning of the natural system and its correlation with the living world.
2. To develop an understanding that human beings, plants and animals are part of a natural phenomenon and are interdependent.
3. To appreciate influence of human activity on the natural processes.
4. To develop awareness of the need and responsibility to keep the natural system in a condition that it sustains life.
5. To develop sensitivity in personal attitudes to environmental issues.
6. To develop a keen civic sense.
7. To develop a sense of responsibility and concern for welfare of the environment and all life forms which share this planet.
8. To develop a sound basis for further study, personal development and participation in local and global environmental concerns.
9. Understand 'development' to intervene in the relationships between society and the natural environment.
10. To participate in local issues through carefully monitored projects.
11. To create awareness about the role of local communities in sustainable growth.
12. To develop an understanding of how local environments contribute to the global environment.

CLASS IX

There will be one paper of two hours duration carrying 100 marks and Internal Assessment of 100 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.*

THEORY – 100 Marks

1. Introduction

Our main environmental problems.

(i) Understanding ecosystems - threats and conservation measures.

(ii) Resource depletion.

(iii) Waste generation.

(iv) Economic disparities.

(v) Land use.

2. Basic Ecology

(i) Biotic and abiotic components of an ecosystem.

(ii) Food chain, food web and trophic levels.

(iii) Ecological niche, habitat and microhabitat.

(iv) Succession.

(v) Ecotypes.

(vi) Flow of energy through an ecosystem.

(vii) Concept of species.

(viii) Extinction of species.

(ix) Introduced species.

(x) Endemic species.

(xi) Keystone species.

(xii) Kinds of ecosystems.

Suggested Activities/Visits:

- Visit a surviving ecosystem and do a rapid assessment.
- Study natural communities of your neighbourhood like bird, insect population, 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.

(ii) Value of bio-diversity.

Suggested Activities/Visits:

- Visit to a national park /any protected area.
- Interaction with a group involved in conservation.

4. Dynamics of Development and Resource Use

Understanding Development

(i) People as resources.

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

(iii) Urbanization and its impact.

(iv) Ecological footprint of a city.

(v) Population (questioning Malthus, carrying capacity).

(vi) Poverty.

Suggested Activities/Visits:

- Visit a rehabilitation site.
- Visit NGOs working in the field of development.

5. Understanding Land Use

(i) Agriculture

(a) Traditional farming methods.

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

(c) The impact of green revolution practices.

(d) Food scarcity in the midst of plenty.

Suggested Activities/Visits:

- Visit to a modern chemical farm and an organic farm.
- Visit the wholesale market.
- Understand the flow of grain from farmer to the shop.

(ii) Towards a world without hunger

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

- Do nothing farming – Fukuoka.
- Biodynamic farming - Rudolph Steiner.
- Permaculture – Mollison.
- Integrated farming practices.
- Low Input Sustainable Agriculture [LISA]

(b) Assessment of Biotechnology.

(c) Global food security, food aid.

Suggested Activities/Visits:

- Try farming in small plots using different practices.

INTERNAL ASSESSMENT – 100 Marks

Students are recommended to complete **two** case studies and **one** project from the list given below.

Suggested list of Projects/ Case studies for topics from the syllabus -

Basic Ecology

Projects

- Where have all the sparrows gone?
- Why conserve turtles?
- Importance of green areas in a city.
- Importance of mangroves.

Case Study

Study different kinds of existing ecosystems like the Sundarbans, the Sholas, rainforests, scrub forests etc. for the bio-diversity they contain and the pressures they face. (Preferably an ecosystem that is nearby.)

Conservation of Ecosystems

Projects

- Zoos as places for conservation of species.
- Insects as keystone species.
- How can I conserve a piece of land in my neighbourhood.
- Understand the conflict with the usage of CITES - Dolphins and Tuna, Turtles and Shrimp, Norway, Japan and whales, culling elephants in Africa etc.
- Project Tiger, Project Elephant.
- The study of plight of Jarawas in the Andamans (Tribals and their relationship to the environment).
- Protecting and conserving forests, rivers, oceans etc.; strategies, difficulties.
- Is there effective legislation for addressing the environmental concerns?

Dynamics of Development and Resource use

Project

- Conduct a study of a selected area.

Case Studies

- NGO /peoples group working with impact of large projects and/or human rights issues.
- Assessing the impact of women's mobilisation and empowerment.
- Child labour reports.
- Development in a tribal region.
- Sourcing of livelihood in a traditional community.
- Comparative studies.
- Consumer group reports.

Understanding Land Use

(i) Agriculture

Case Studies

- Public Distribution Systems (PDS).
- Alternatives to PDS like the targeted PDS.
- Starvation in Orissa & Andhra Pradesh.
- Agricultural practices of a small and large farmer.

(ii) Towards a world without hunger

Project

- Is bio-technology the answer to the worlds food problems?

Case Studies

- The case of Bt. Cotton.
- Terminator and traitor technology.
- The case of golden rice.
- Bio-piracy.

Mapping - What I can do:

- In my home.
- In my School.
- In my neighbourhood.

CLASS X

There will be one paper of two hours duration carrying 100 marks and Internal Assessment of 100 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.*

THEORY – 100 Marks

1. Caring for our Basic Resources

(i) Caring for our Soil

(a) Causes and consequences of soil erosion.

(b) Soil conservation strategies.

- Contour bunding.
- Tree breaks.
- Check dams.

(c) Fuel wood crisis.

(d) Waste generation - its toxicity and its impact on life and land.

(e) Treatment of wastes.

- Effluent treatment plants.
- Biological treatment.
- Strategies to reuse waste.
- Combating deforestation.

(f) Alternatives to timber.

Suggested Activities/ Visits:

- Visit an industry to study waste generated and waste treatment.
- Make models of Chula for reduced firewood consumption.
- Model of solar cooker.
- Setting of compost pit.

(ii) Caring for our Air

(a) Technical methods to control air pollution.

(b) Strategies to reduce air pollution –

- Economic
- Technical
- Traffic management

(c) Legislation as a means to reduce air pollution.

(d) Remote sensing satellites and their applications.

(e) International norms on air pollution.

Suggested Activities/ Visits:

- Visit to a pollution control board.
- Interaction with an NGO working in the field of environment.

(iii) Caring for our Water

(a) Technique of Watershed Management.

(b) Rain water harvesting

- Roof water harvesting through percolation pits, etc.
- Water harvesting in rural areas through check dams, bunds, etc.

(c) Small dams vs. large dams.

(d) Water recycling.

(e) Alternatives to existing sewage treatment like dry compost toilets.

Suggested Activities / Visits

- Carry out rain water harvesting in the neighbourhood.
- Visit a catchment area of the city.
- Visit to a nearby dam.

2. Resource use

(i) Impact of globalisation on environment.

(ii) Role of NGOs in sustaining environment.

(iii) Evolving a sustainable growth paradigm, eg. Gandhi. Large-scale development vs. village community based self-sufficient growth.

(iv) North -South divide.

Suggested Activities / Visits

- Visit to a Khadi production center or other such units.

3. Appropriate Eco Friendly Technologies

(i) Scope and limitation of indigenous technology and modern technology.

(ii) Need for developing intermediate and appropriate technology.

(iii) Developing least cost options.

(iv) Natural resource accounting.

Suggested Activities / Visits

- Visit a modern power plant.
- Visit a village with traditional occupation like weaving, pottery, etc.
- Visit a Bio-gas plant.

4. Initiatives I can take

(i) In my local environment.

(ii) In my future career choice.

(iii) In supporting initiative in my State or Country.

INTERNAL ASSESSMENT – 100 Marks

Students are recommended to complete **two** case studies and **one** project from the list given below.

Suggested list of Projects/ Case studies for topics from the syllabus–

1. Caring for our Basic Resources

(i) Caring for our Soil

Projects

- How can a society produce less waste?
- Examine the problem of plastics.
- Setting up a safe plastic disposal system in a city.
- What are toxic wastes?
- Should oceans act as waste dumps?

Case Studies

- Tarun Bharat Sangh's work in Alwar.
- Case study of Anna Hazare's work in Ralegoan Siddhi.
- Auroville's afforestation effort.
- Environmental effects of mining, brick industry.
- Use of resources in a city. Compare with the resource used in a rural community.
- India’s growing population problem - a critical analysis.

(ii) Caring for our Air

Projects

- Monitor pollution in busy traffic places.
- Role of vehicles in causing respiratory health problems.
- Is better public transport an answer to reducing air pollution in cities.

Case Studies

- Generating power through burning garbage - is it a good way of dealing with garbage?
- Medical waste disposal through incineration - is there an option?
- Can pollution be reduced by better city planning (one way lanes, synchronized signals, etc.)
- Bhopal gas tragedy.
- Chernobyl tragedy.

(iii) Caring for our Water

Project

- Is water being wasted through modern sewage disposal system in cities?

Case Studies

- Water shortage in Kerala and Chirapunji.
- Rajasthan's water conservation systems.
- Salt water intrusion
- Ground water depletion.

- Contamination of surface water.
- Laws relating to rain water harvesting in cities.
- The politics of water sharing like the Cauvery issue.
- Narmada issue.
- The Tehri dam issue.
- The three gorges project in China.

2. Resource Use

Projects

- Assess the impact of any movement related to displacements or violations.
- Look at Governmental and Non-Governmental supports to promote local initiative in the area of sustainable growth.

Case Studies

- Reports by NGOs on Globalisation impacts.
- Captive minds captive lives – Vandana Shiva.
- The unseen worker – National Foundation of India.
- Excerpts from E.F. Schumacher's work "Small is Beautiful".
- Voluntary action and Gandhian approach – D. K. Oza.
- J.C. Kumarappa's writing.
- Gandhi's writings.

3. Appropriate Eco friendly Technologies

Project

- Can Non-conventional sources meet the growing demand for power?

Case Studies

- Dr. A.K.N. Reddy's work in creating a network of villages in Tumkur district based on appropriate technologies.
- MNES publications.

Guidelines for evaluating Project Work

The project has to be evaluated for the efficacy of the following steps:

1. Coming up with a clear question or problem statement, which will be the basis of the students project research. This is critical because without a clear question the research tends to be broad and unfocussed, with the student tending to gather whatever information is available rather what they need to have.

   Criteria of evaluation for this stage will therefore include definition in terms of the focus and clarity of the question.

2. Formulating an action plan, which states the steps to be taken to move the question forward.

   Criteria of evaluation for this stage will include how pragmatically the plan takes the question forward.

3. Gathering primary data

   50% -70% of information gathered needs to be primary data i.e., data gathered by the student by going into the field.

   This may involve evolving a questionnaire for social issues and formats for ecology related projects. Sample size and type have to be adequate and scrutinized carefully.

   Criteria of evaluation for this stage will therefore be based on quantum of fieldwork and efficacy of sampling.

4. Secondary data

   Secondary data from books, Internet and other publications is used only as a basis to substantiate, analyse and to construct an argument.

   Criteria of evaluation for this stage will therefore include appropriate choice and use of secondary data.

5. Collating data and generating solutions

   This phase after the gathering of the data is one of stock taking i.e. putting together of information. The data is then analysed and the solutions generated. The initial project report is put together.

Criteria of evaluation for this stage will therefore include sifting and organisation of relevant data, complexity of analysis in terms of number and relevance of parameter chosen and feasibility and innovation of solutions generated.

6. Project Report

   The research the student does is submitted as a project report comprising of the following:

   i. Statement of the topic, issue or problem being studied / researched.
   ii. Statement of the action plan.
   iii. Presentation of data using different methods such as bar charts/ pie diagram etc. A clear distinction has to be made between primary and secondary data.
   iv. Analysis of data.
   v. Solutions offered.
   vi. Personal learning for the student.
   vii. Bibliography and acknowledging resource persons.

   Criteria of evaluation for this stage will therefore include readability, precision, neatness and indexing.

   Therefore the evaluation is on-line and does not base itself entirely on the project report.

7. VIVA-VOCE (Optional)

   A viva may be conducted with the subject teacher and an External Examiner who could be another teacher from the school itself or an experienced person from the environmental field, preferably a researcher.

   The purpose of the viva is to give the student an opportunity to converse with an expert in the field regarding his / her project. This would help to deepen the learning for the students and help them understand the lacunae in their thinking and process.

Guidelines for evaluating Case Studies

Case studies unlike projects are not based on primary data but entirely on secondary data mostly about a particular event or case.

The student presents it as a report about 1500 words long. It may be evaluated for:

- Comprehensiveness;
- Accuracy;
- Range of sources;
- Inferences drawn;
- Connections made;
- Perspective gained, etc.

Marks may be awarded on the following break up:

Project	-	30
Case studies	-	20
Total	-	50

EVALUATION

The assignments/project work is to be evaluated by the subject teacher and by an External Examiner. The External Examiner may be a teacher nominated by the Principal, who could be from the faculty, **but not teaching the subject in the section/class.**

The Internal Examiner and the External Examiner will assess the assignments independently.

Award of marks (100 marks)

Subject Teacher (Internal Examiner): 50 marks
External Examiner: 50 marks

The total marks obtained out of 100 are to be sent to the Council by the Principal of the school.

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

INTERNAL ASSESSMENT IN ENVIRONMENTAL APPLICATIONS - 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.