LESSON PLAN NO.1

General Aims: (1) To develop the scientific attitude among the students.
(2) To develop attitude towards environmental education among the students.
(3) To develop clear thinking and environmental awareness among the students.
(4) To develop attitude towards environmental pollution among the students.

Specific Aim: To provide knowledge to students about “Ecosystem and its types”

P.K. Assumed: It is assumed that the students will be aware of the terms environment, biotic and abiotic components of environment and ecology.

P.K. Testing:

Q1. Define environment.

Q2. What are the two main components of environment?

Q3. Name the branch of study that deals with the interaction between living organism and their environment?

Q4. Define ecosystem and what are the various types of ecosystem?

Announcement of the Topic:

Well students, today we will study about “Ecosystem and its types”

Presentation: Lesson will be developed by the lecture method.

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>PT’s Activity</th>
<th>Pupil’s Activity</th>
<th>BB Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>The living organisms in the pond, the water in it, the stones and the mud at the bottom make up an ecosystem. An ecosystem may either be natural or artificial. They again can be divided broadly into terrestrial and aquatic ecosystem Terrestrial</td>
<td>PT will explain the definition verbally. PT will perform an activity. PT will ask one of the students to come and ask him/her to put some H₂O in beaker than come the mud and some leaves in the beaker. Then PT will</td>
<td>Students will listen carefully to the definition and observe the activity.</td>
<td>Two types of Ecosystem: Natural and Artificial</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aquatic Ecosystem and Terrestrial Ecosystem</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Terrestrial Ecosystem includes Forest, Grassland and Desserts</td>
</tr>
<tr>
<td>Ecosystems</td>
<td>Description</td>
<td>Activity</td>
<td>Notes</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
<td>----------</td>
<td>-------</td>
</tr>
<tr>
<td>Forest Ecosystem: Tropical rainforest</td>
<td>Have the highest rainfall of any of the ecosystem and the greatest diversity in plants and animals. Trees grow tall and many other plants grow around them.</td>
<td>PT will show the chart of forest ecosystem and explain the type of plants and animals in tropical rainforest</td>
<td>Forest Ecosystem: Tropical Rainforest have the highest rainfall and greatest diversity of plants &amp; animals</td>
</tr>
<tr>
<td>Grasslands:</td>
<td>Are characterized by low growing plants and a few scattered trees. Tree growth is limited by regular periods of drought, grazing and occasional fires eg: Tropical Savannah in Africa &amp; Prairies in North America</td>
<td>PT will show the chart of Grassland ecosystem and explain the causes for the limited growth of the plants.</td>
<td>Grasslands: Tropical Savannah in Africa in North America</td>
</tr>
<tr>
<td>Desert Ecosystem:</td>
<td>Deserts are the driest of all the ecosystem, they receive less than 30cm rainfall per year. Desert plants have adaptations like leaves reduced to spines cactus.</td>
<td>PT will explain the desert ecosystem using black board.</td>
<td>Desert Ecosystem: Less Average Rainfall - 30cm per year</td>
</tr>
<tr>
<td>II. Aquatic Ecosystem including Freshwater and Marine water Ecosystem &amp; Estuarine water</td>
<td></td>
<td>PT will explain the Aquatic ecosystem verbally</td>
<td>Aquatic Ecosystem : Freshwater, Marine &amp; Estuarine water</td>
</tr>
</tbody>
</table>
### Freshwater Ecosystem

#### i) Lotic Ecosystem
- Has flowing water environments.
- They have unidirectional flow of water.
- Lotic ecosystem has flowing water.

#### ii) Lentic Ecosystem
- Have standing water environments and contain stagnant water.
- It has three basic life zones: littoral, limnetic, and profundal.
- Lentic ecosystems have standing water.
- Three basic life zones: littoral, limnetic, and profundal.

### Saltwater Ecosystem or Marine Ecosystem
- Include Sea. It covers 70% of earth’s surface and is characterised by its high concentration of salt and mineral ions.
- It is divided into intertidal, neritic, and oceanic zones.
- Intertidal zone: where land and water meets.
- Neritic zone: extends from intertidal zone to continental shelf.
- Oceanic zone: open ocean. It further include Pelagic or open water and Benthic or Ocean Bottom Zones.
- Deepest part of ocean is known as abyssal zone.
- Photic zone: which receives light and Aphotic zone is where there is no light at all.
zone. Photic zone is the zone of ocean which receives light and aphotic zone is where there is no light at all.

<table>
<thead>
<tr>
<th>Types of Marine Life:</th>
<th>PT will explain the types of marine life using flash cards</th>
<th>Pupils will observe and listen carefully</th>
<th>Types of Marine Life:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine habitats contain three main ecological groups of organisms. (1) Plankton (2) Nekton (3) Benthos</td>
<td>PT will explain 3 types one by one with examples of each types and write on black board</td>
<td>Pupils will listen carefully and note down</td>
<td>(1) Plankton (2) Nekton (3) Benthos</td>
</tr>
<tr>
<td>(1) <strong>Plankton:</strong> Free floating organisms incapable of swimming they include Phytoplankton plant plankton, photosynthetic blue green (cyanobacteria) and green algae Zooplankton – animal plankton – the non photosynthetic species</td>
<td><strong>Plankton:</strong> Free floating organisms incapable of swimming Phytoplankton: photosynthetic blue green algae (cyanobacteria) and Zooplankton: non photosynthetic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) <strong>Nekton:</strong> are stronger swimming species e.g. fish, turtles, whales</td>
<td>PT will ask the question name the marine species which can swim? and write on black board</td>
<td><strong>Nekton:</strong> are stronger swimming species e.g. fish, turtles, whales</td>
<td></td>
</tr>
<tr>
<td>(3) <strong>Benthos</strong> the plants and animals that live on the bottom including seaweeds, barnacles, lobsters, worms, crustaceans</td>
<td>PT will explain benthos and write on black board</td>
<td><strong>Benthos</strong> : plants and animals that live on the bottom eg. seaweeds, barnacles, lobsters, worms, crustaceans</td>
<td></td>
</tr>
</tbody>
</table>
### Estuarine/Brackish Coastal Water Ecosystems

It includes shallow, partially enclosed areas where freshwater and sea water mix. It has highly variable environments. Mangrove tree is well adapted to swamp’s salty environment.

PT will explain the Estuarine/Brackish coastal water ecosystem using blackboard.

Students will observe carefully.

Example mangrove tree

### Components of Ecosystem

A number of factors affect the distribution of organisms in an ecosystem. These physical factors are known as abiotic. Biotic factors which involve the effects of other living organisms, including humans on the distribution and behaviours of species in the ecosystem.

PT will explain the components of ecosystem using blackboard.

Students will observe carefully.

Example mangrove tree

### Physical factors are known as abiotic

#### Biotic factors: involve the effects of other living organisms

1) Climatic: temperature light, wind and water availability.
2) Soil or Edaphic factors.
3) Topographic: attitude, aspect (whether north-facing or south-facing) and inclination (steepness of slope) latitude etc.
4) Salinity, wave action, oxygen concentration
4) Others – such as salinity, wave action, oxygen concentration etc. which are relevant in specific situations like fire, flood etc. Plants that can tolerate high levels of salts are known as halophytes.

PT will explain and write the definition of halophytes on blackboard.  
Student will listen and write on copies.  
Halophytes: Plants that can tolerate high level of salts are known as halophytes.

<table>
<thead>
<tr>
<th>Biotic Component</th>
<th>PT will explain the biotic component verbally.</th>
<th>Pupil will listen carefully.</th>
<th>Biotic Components: Autotrophs and Heterotrophs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>include relationships between living organisms. Biotic components include</td>
<td></td>
<td></td>
<td>Autotrophs: They make their own food.</td>
</tr>
<tr>
<td>1) Autotrophs: They make their own food using an external energy source and a simple inorganic supply of carbon dioxide. Photo autotrophs: use sunlight as their energy source and include photosynthetic green plants, algae and bacteria. Chemoautotrophs: utilize energy derived solely from chemical reactions and include only bacteria, occurring in the nitrogen cycle and in deep sea hydro-thermal vent communities. Heterotrophs: They cannot make their own food, they</td>
<td></td>
<td>Photo autotrophs</td>
<td>Chemoautotrophs</td>
</tr>
</tbody>
</table>
Generalisation:

- So, students today we have studied about the types of ecosystem i.e. terrestrial and aquatic ecosystem and also the components of the ecosystem biotic and abiotic and interaction between these components.

Final Recapitulation

Ques: Define Terrestrial ecosystem?

Ques: Name the types of Aquatic ecosystem?

Ques: What do you mean by Biotic components of ecosystem?

Ques: What do you mean by Abiotic components of ecosystem?

Home work

PT will ask the students to draw the flow chart of type of ecosystem and components of ecosystem.
LESSON PLAN NO.2

General Aims: (1) To develop the scientific attitude among the students.
(2) To develop positive and healthy attitude towards environmental education among the students.
(3) To develop clear thinking and environmental awareness among the students.
(4) To develop positive and healthy attitude towards environmental pollution among the students.

Specific Aim: To provide knowledge to students about “Energy flow and nutrient recycling”.

P.K. Assumed: It is assumed that the students will be aware of the terms environment, biotic and abiotic components of environment, ecology and types of ecosystem.

P.K. Testing:

Q1. Define environment.
Q2. What are the two main components of environment?
Q3. Name the branch of study that deals with the interaction between living organism and their environment.
Q4. Explain the mechanism of energy flow in the ecosystem.

Announcement of the Topic:

Well students, today we will study about “Energy flow and nutrient recycling”

Presentation: Lesson will be developed by the lecture method.

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>PT’s Activity</th>
<th>Pupil’s Activity</th>
<th>BB Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy flows from one trophic level to another. Trophic levels are the steps in the food chain comprising of different types of organisms. Autotrophs</td>
<td>PT will explain the concept of trophic level verbally</td>
<td>Students will listen carefully.</td>
<td>Steps in food chain</td>
</tr>
<tr>
<td></td>
<td>PT will explain autotrophs with</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
prepare their own food using an external energy source. Carnivores are flesh eating animals. They feed on herbivores or plant eating animals. Secondary carnivores like sharks feed on fish which is a primary carnivore. Lion is an example of Carnivorous Animal. Decomposers break down the bodies of dead animals and plants. Process of decomposition allows mineral nutrients to be recycled in the ecosystem. Fungi and bacteria are examples of decomposers. Earthworm is an example of Decomposer Different organisms of an ecosystem linked together by their nutritional requirements form a food chain. Networks of a number of food the help of flash cards

PT will explain carnivores with the help of flash cards

Students will observe and listen carefully

Pupils will observe the flash cards carefully

PT will explain decomposers with the help of flash cards

PT will explain the concept of foodchain using flash cards

PT will explain foodweb with the help of flash cards

Pupils will note down carefully

Pupils will observe the flash cards carefully
Chains existing in an ecosystem form a food web. Steps in a food chain at which transfer of food energy takes place are known as trophic levels. 10% energy is transferred from one trophic level to other Trophic level.

Water cycle
Maximum water is found in oceans. By evaporation and transpiration it is taken up into clouds. It returns to oceans, land and lakes by rainfall. Water that enters the soil returns to the oceans through run off.

Carbon cycle
Most carbon is found as carbon dioxide in the atmosphere and taken in by green plants in photosynthesis then eaten by animals. It is recycled back to atmosphere by respiration of plants, animals and microbes.

Nitrogen cycle
Most of PT will explain water cycle with the help of chart
Pupils will observe the chart carefully

PT will explain carbon cycle with the help of chart
Pupils will observe the chart carefully

PT will explain nitrogen cycle with the help of chart
Pupils will observe the chart carefully
atmospheric nitrogen is unavailable for protein synthesis. It is taken by plants in the form of nitrates from the soil and incorporated into protein.

<table>
<thead>
<tr>
<th>Atmospheric Nitrogen</th>
<th>Nitrogen Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is unavailable for protein synthesis. It is taken by plants in the form of nitrates from the soil and incorporated into protein.</td>
<td><img src="image" alt="Nitrogen cycle diagram" /></td>
</tr>
</tbody>
</table>

**Generalisation:** So, students today we have studied about trophic levels that are the steps in the food chain comprising of different types of organisms. Autotrophs prepare their own food. Carnivores are flesh eating animals. Decomposers break down the bodies of dead animals and plants. Networks of a number of food chains existing in an ecosystem form a food web. Water, carbon and nitrogen cycle.

**Final Recapitulation:**

Ques: Define food chain.

Ques: Give an example of autotrophs.

Ques: Define food web.

Ques: What do you mean by Decomposers?

**Home work**

PT will ask the students to draw food web.
LESSON PLAN NO.3

General Aims: (1) To develop the scientific attitude among the students.
(2) To develop attitude towards environmental education among the students.
(3) To develop clear thinking and environmental awareness among the students.
(4) To develop attitude towards environmental pollution among the students.

Specific Aim: To provide knowledge to students about “Renewable sources of energy”

Pk Assumed: It is assumed that the students will be aware of the components and types of ecosystem and nutrient recycling.

Pk Testing:
Q1. What are the various types of ecosystem?
Q2. Give an example of terrestrial ecosystem.
Q3. How is carbon recycled in nature?
Q4. What are renewable sources of energy?

Announcement of the Topic:
Well students, today we will study about “Renewable sources of energy”

Presentation: Lesson will be developed by the lecture method.

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>PT’s Activity</th>
<th>Pupil’s Activity</th>
<th>BB Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources are categorised as renewable and nonrenewable. Energy generated by using wind, tides, solar, geothermal heat, and biomass including farm and animal waste as well as human excreta is known as non-conventional energy. All these sources are</td>
<td>PT will explain renewable and non renewable sources of energy with the help of chart</td>
<td>Pupils will observe the chart carefully</td>
<td></td>
</tr>
</tbody>
</table>

Resources

- Renewable
  - Solar Energy
  - Air, Wind
  - Water, Tides, Flowing
  - Soil, Plants

- Nonrenewable
  - Fossil Fuels
  - Coal
  - Natural Gas
  - Metallic Minerals
  - Copper
  - Aluminium
  - Nonmetallic Minerals
  - Soil Phosphates
renewable or inexhaustible and do not cause environmental pollution. More over they do not require heavy expenditure Non conventional/ Renewable sources of energy

**Wind Energy:**
Wind power is harnessed by setting up a windmill which is used for pumping water, grinding grain and generating electricity.

**Tidal Energy:**
Sea water keeps on rising and falling alternatively twice a day under the influence of gravitational pull of moon and sun. This phenomenon is known as tides. The Gulf of Kuchchh is best suited for tidal energy.

**Solar Energy:**
Sun is the source of all energy on the earth. It is most abundant, inexhaustible and universal source of energy. India has developed technology to use solar energy for cooking, water heating, water dissimilation, space heating, crop drying etc.

<table>
<thead>
<tr>
<th>PT will explain renewable sources of energy with the help of chart</th>
<th>Pupils will observe the chart carefully</th>
<th>Renewable sources of energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT will explain wind energy with the help of chart</td>
<td>Pupils will observe the chart carefully</td>
<td></td>
</tr>
<tr>
<td>PT will explain tidal energy verbally</td>
<td>Students will listen carefully</td>
<td></td>
</tr>
<tr>
<td>PT will explain solar energy with the help of blackboard</td>
<td>Students will listen carefully</td>
<td></td>
</tr>
</tbody>
</table>

**Wind Energy:**
Wind power is harnessed by setting up a windmill which is used for pumping water, grinding grain and generating electricity.

**Tidal energy: by sea tides**

**Solar energy: by sun, used for cooking, water heating, water dissimilation, space heating, crop drying etc.**
4. **Geo-Thermal Energy:**
Geo-thermal energy is the heat of the earth's interior. This energy is manifested in the hot springs. India is not very rich in Geothermal energy source.

**Importance of non-conventional sources of energy:**
1. The non-conventional sources of energy are abundant in nature.
2. These are renewable resources. The non-conventional sources of energy can be renewed with minimum effort and money.
3. Non-conventional sources of energy are pollution-free and eco-friendly.

<table>
<thead>
<tr>
<th>Task</th>
<th>PT Action</th>
<th>Students Action</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Geothermal Energy: Heat energy of earth’s interior                    | PT will explain geothermal energy verbally | Students will listen carefully | Importance of non-conventional sources of energy:  
* Abundant  
* Renewed freely  
* Pollution free |

**Generalisation:**
So, students today we have studied about the renewable sources of energy. Energy generated by using wind, tides, solar, geothermal heat, and biomass including farm and animal waste as well as human excreta is known as non-conventional energy. Non-conventional sources of energy are pollution-free and eco-friendly.

**Final Recapitulation**

Ques: Define renewable sources of energy.

Ques: Name renewable sources of energy?

Ques: How can wind energy be used?

Ques: What do you mean by solar energy?

**Home work**

PT will ask the students to draw the flow chart of types of renewable sources of energy.
LESSON PLAN NO.4

**General Aims:**
1. To develop the scientific attitude among the students.
2. To develop attitude towards environmental education among the students.
3. To develop clear thinking and environmental awareness among the students.
4. To develop attitude towards environmental pollution among the students.

**Specific Aim:** To provide knowledge to students about “Destruction of ecosystem & Depletion of Resources”

**Pk Assumed:** It is assumed that the students will be aware of renewable and non-renewable sources of energy and types of ecosystem.

**Pk Testing:**
- Q1. What are the various types of ecosystems?
- Q2. Define renewable and non-renewable sources of energy.
- Q3. How are the resources depleted?
- Q4. What are the causes of Destruction of ecosystem?

**Announcement of the Topic:**
Well students, today we will study about “Destruction of ecosystem & Depletion of Resources”

**Presentation:** Lesson will be developed by the lecture method.

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>PT’s Activity</th>
<th>Pupil Activity</th>
<th>BB Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution is addition of toxic</td>
<td>PT will explain pollution using blackboard.</td>
<td>Students will listen carefully</td>
<td>Pollution is addition of toxic substances in environment as a result of</td>
</tr>
<tr>
<td>substances in environment as a result of human action and natural disasters.</td>
<td>PT will explain pollutant using blackboard</td>
<td></td>
<td>human action and natural disasters</td>
</tr>
<tr>
<td>A pollutant is defined simply as any waste material that pollutes water, air or soil.</td>
<td>Students will listen carefully</td>
<td></td>
<td>A pollutant is defined simply as any waste material that pollutes water, air or soil.</td>
</tr>
<tr>
<td>Air pollution is the introduction of chemicals, particulate matter, or</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
biological materials that cause harm or discomfort to humans or other living organisms, or cause damage to the natural environment or built environment, into the atmosphere. Air pollution leads to severe breathing problems. There is a "natural" greenhouse effect that keeps the Earth's climate warm and habitable. There is also the "man-made" greenhouse effect, which is the enhancement of Earth's natural greenhouse effect by the addition of greenhouse gases from the burning of fossil fuels mainly petroleum and natural gas. Greenhouse gases reduce the rate at which the Earth's surface loses infrared radiation to outer space, this makes the Earth's surface and lower atmosphere warmer than they would otherwise be. This leads to global warming. The phenomenon of unequal rise in temperature of earth's surface due to human activities like pollution and deforestation is called as global warming.

Water pollution is the contamination of water bodies (e.g. lakes, rivers, oceans, aquifers and groundwater). Water pollution occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment to remove harmful

| PT will explain air pollution using blackboard | Students will listen carefully | Air pollution is the introduction of chemicals, particulate matter, or biological materials that cause harm to the atmosphere. |
| PT will explain greenhouse effect using blackboard | Students will listen carefully | Greenhouse effect keeps the Earth's climate warm and habitable. Burning of fossil fuels mainly petroleum and natural gas. Greenhouse gases reduce the rate at which the Earth's surface loses infrared radiation to outer space, this makes the Earth's surface and lower atmosphere warmer. |
| PT will explain global warming using blackboard | Students will listen carefully | The phenomenon of unequal rise in temperature of earth’s surface due to human activities like pollution and deforestation is called as global warming. |
| PT will explain water pollution using blackboard | Students will listen carefully | Water pollution is the contamination of water bodies. |
compounds. Water pollution leads to the decrease or even extinction of water dwelling species. Eutrophication is the result of water pollution. It is the ecosystem response by growth of algae on surface of water due to the addition of artificial or natural substances, such as nitrates and phosphates, through fertilizers or sewage, to an aquatic system.

Land pollution is the demolition of Earth's land surfaces often caused by human activities and their misuse of land resources. Urbanization and industrialization are major causes of land pollution. Growth of human population leads to habitat deterioration.

Causes of ecosystem destruction:
- Natural forest fires and manual cutting of trees destroy the ecosystem. Clearing the forests, forest fires lead to destruction of the ecosystem. The growth of industries besides human development has lead to pollution. Acid rain is one of the results of Industrialisation.
- Another problem associated with excessive irrigation on poorly drained soils is waterlogging. This occurs (as is common for salinization) in poorly drained soils where water can't penetrate deeply.
- Excessive irrigation on poorly drained soils is waterlogging.

| PT will explain eutrophication using blackboard | Students will listen carefully | Eutrophication is the result of water pollution. It is the ecosystem response by growth of algae on surface of water due to the addition of unwanted substances |
| PT will explain land pollution using blackboard | Students will listen carefully | Land pollution is the demolition of Earth's land surfaces |
| PT will explain cause of ecosystem destruction blackboard | Students will listen carefully | Causes of ecosystem destruction |
| PT will explain cause of ecosystem destruction water logging blackboard | Students will listen carefully | Natural forest fires and manual cutting of trees |
Overexploitation of natural resources due to human activity lead to pressures and intruding on natural habitat. This is termed as encroachment.

In Shifting cultivation known as slash and burn cultivation, a small patch of native forest is cleared by felling trees and then by burning them nutrients are released. Seeds are planted on soil ash mixture. Plants like maize, banana are planted. It leads to reduced fertility of the soil.

Construction of dams for hydroelectricity generation, irrigation lead to permanent environmental change leading to loss of resources by flooding an area not previously covered with water. Extraction of minerals from earth also lead to pollution. For example, Strip mining of coal leads to extensive disruption of land surface. Extraction of oil by offshore drilling and transportation may lead to massive spill and thus causing harm to marine environment.

Wars cause vast devastation on human life and civilisation along with irreversible changes in environment and environmental pollution. The atom bombs dropped in Hiroshima and Nagasaki are examples of environmental pollution caused by radiations.

<table>
<thead>
<tr>
<th>Causes of ecosystem destruction:</th>
<th>Shifting cultivation known as slash and burn cultivation, a small patch of native forest is cleared by felling trees and then by burning them nutrients are released. Seeds are planted on soil ash mixture.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction of dams, extraction of minerals, wars as cause of ecosystem destruction</td>
<td>Wars cause vast devastation on human life, The atom bombs dropped in Hiroshima and Nagasaki are examples of environmental pollution caused by radiations.</td>
</tr>
<tr>
<td>Students will listen carefully</td>
<td>Students will listen carefully</td>
</tr>
<tr>
<td>PT will explain shifting cultivation using blackboard</td>
<td>PT will explain construction of dams, extraction of minerals, wars as cause of ecosystem destruction using blackboard</td>
</tr>
</tbody>
</table>
In silviculture natural habitat such as forests and wetlands are cleared and drained for agricultural use or sometimes for the cultivation of trees. Silviculture leads to loss of habitat of living species.

| PT will explain silviculture using blackboard | Students will listen carefully | Silviculture: natural habitat such as forests and wetlands are cleared and drained for agricultural use |

**Generalisation:** So, students today we have studied about pollution and its types and various causes of ecosystem destruction. Natural forest fires, Clearing the forests, Industrialisation, Waterlogging, Overexploitation of natural resources, Shifting cultivation, Silviculture.

**Final Recapitulation:**

Ques: Define Waterlogging.

Ques: Explain Shifting cultivation.

Ques: Define Silviculture.

**Home work**

PT will ask the students to make a collage on the causes of ecosystem destruction.
LESSON PLAN NO.5

**General Aims:**
1. To develop the scientific attitude among the students.
2. To develop attitude towards environmental education among the students.
3. To develop clear thinking and environmental awareness among the students.
4. To develop attitude towards environmental pollution among the students.

**Specific Aim:** To provide knowledge to students about “Conservation of resources”.

**Pk Assumed:** It is assumed that the students will be aware of renewable and non-renewable resources, depletion of resources and destruction of ecosystem.

**Pk Testing:**

Q1. Define renewable resources.

Q2. What are non-renewable resources.

Q3. What are the causes of depletion of resources?

Q4. How can we conserve resources?

**Announcement of the Topic:**

Well students, today we will study about “Conservation of resources”

**Presentation:** Lesson will be developed by the lecture method.

<table>
<thead>
<tr>
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<th>PT’s Activity</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Scientific management of man’s surroundings to prevent its exploitation or destruction is termed as conservation. Reforestation is an example of conservation. Management of resources to meet changing human needs and improving the quality of environment is termed as sustainable development.</td>
<td>PT will explain the concept of conservation verbally.</td>
<td>Students will listen carefully</td>
<td>Scientific management of man’s surroundings to prevent its exploitation or destruction is termed as conservation. Using the available energy efficiently is termed as energy conservation. Management of resources to meet changing human needs and improving the quality of environment is termed as sustainable development.</td>
</tr>
</tbody>
</table>
Environmental, social and economic are three spheres of sustainability. Steps taken to preserve the wild life to maintain balance is termed as conservation of wildlife. Animals should not be killed to get their skin, antlers, bones, feather, ivory etc. The species near extinction should be looked after carefully. National parks and sanctuaries are steps taken to conserve wildlife.

IUCN-International Union for conservation of nature and natural resources.

WWF-World wildlife fund focuses on conservation of wildlife.

CONSERVATION OF AGRICULTURE
Growing two or more crops on the same piece of land alternatively so as to replenish the fertility of soil is called crop rotation. It is an example of conservation of agriculture.

Crop rotation means to plant crops in turns such that nutrient balance of the soil is maintained.

Crop rotation means to plant crops in turns such that nutrient balance of the soil is maintained. Planting two or more crops at the same time side by side to maintain the fertility of soil is mixed cropping.

PT will explain conservation of wildlife verbally. Students will listen carefully.

PT will explain conservation of agriculture, crop rotation with the help of chart. Students will observe and listen carefully.

PT will explain conservation of agriculture, mixed cropping. Students will observe and listen carefully.
| Called mixed cropping. Only green manures are used in organic farming. Biofertilisers are used and biological control of pest occur in organic farming. Vermicomposting is the process of using worms and micro-organisms to turn kitchen waste into a black, earthy-smelling, nutrient-rich humus. Earthworms are commonly used for the process of converting kitchen waste into biomanure this is called Vermicomposting. Biomass refers to all plant material and animal excreta when considered as an energy source. Some important kinds of biomass are inferior wood, urban waste, bagasse, farm animal and human waste. Compressed Natural Gas is a domestically available, economical, clean burning, alternative fuel source for vehicles. It has higher initial investment, lower running cost, lesser power delivery, lesser tune-ups required, bulkier and heavier storage tanks, limited availability, no carbon deposits, fewer oil changes, safer, lighter, high ignition temperature, popular with commercial vehicles. | Cropping with a chart | PT will explain conservation of agriculture, vermicomposting verbally | Students will listen carefully | Paddy n brassica planted at the same time it is an example of mixed cropping. Vermicomposting is the process of using worms and micro-organisms to turn kitchen waste into a black, earthy-smelling, nutrient-rich humus. Biogas plant | PT will explain biogas formation verbally | Students will listen carefully | PT will explain CNG using BB | Students will listen carefully | Compressed Natural Gas is a domestically available, economical, clean burning, alternative fuel source for vehicles. |
LPG - Liquified Petroleum Gas is a hydrocarbon fuel, lighter than petroleum. Can be used as automotive fuel. It has lower initial investment, higher running cost, increased power delivery, more refined, required smaller and lighter storage tanks, far better availability, cleaner emissions, heavier, low ignition temperature, popular with private vehicles.

PT will explain LPG using BB

Students will listen carefully

LPG- Liquified Petroleum Gas is a hydrocarbon fuel, lighter than petroleum. Can be used as automotive fuel.

**Generalisation:**- So, students today we have studied about conservation, sustainable development, crop rotation, mixed cropping, vermicomposting, LPG, CNG.

**Final Recapitulation**

Ques: Define sustainable development.

Ques: Explain crop rotation.

Ques: Define mixed cropping.

Ques: What is vermicomposting?

**Home work**

PT will ask the students to write a short note on various techniques of conservation.
LESSON PLAN NO.6

**General Aims:**
(1) To develop the scientific attitude among the students.
(2) To develop attitude towards environmental education among the students.
(3) To develop clear thinking and environmental awareness among the students.
(4) To develop attitude towards environmental pollution among the students.

**Specific Aim:** To provide knowledge to students about “Waste generation and management”.

**Pk Assumed:**- It is assumed that the students will be aware of types of pollution.

**Pk Testing:**

Q1. Define Pollution.
Q2. What are the various types of pollution?
Q3. What is the main cause of land pollution?
Q4. How can waste be managed?

**Announcement of the Topic:**

Well students, today we will study about “Waste generation and management”

**Presentation:** Lesson will be developed by the lecture method.

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>PT’s Activity</th>
<th>Pupil’s Activity</th>
<th>BB Summary</th>
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</thead>
<tbody>
<tr>
<td>According to the states of matter, wastes are of three types solid, liquid and gaseous. Waste management is essential to reduce the level of air, water, soil pollution. To improve human health, to preserve and recycle resources. Waste management involves: Collection, segregation and recycling. Collection of wastes: Municipal corporation cleans the roads and sewers. Each city has</td>
<td>PT will explain waste management</td>
<td>Students will listen carefully</td>
<td>Waste management involves: Collection, segregation and recycling</td>
</tr>
</tbody>
</table>
Segregation of wastes:
Waste is segregated as organic, inorganic, hazardous, non hazardous, biodegradable, non biodegradable, industrial, domestic, recyclable, non recyclable. Different coloured dustbins are used.

1. Green coloured: All recyclable material is thrown in this dustbin e.g. leftover chapatti, bread, fruit and vegetable peelings, paper, wood shavings, leaf plates, cardboard, newspaper etc.

2. Blue coloured: Non biological wastes are collected in these e.g. plastics, glass, polythene, metal, tin boxes, hospital wastes.

3. Red coloured: Infectious wastes, radioactive wastes, medical wastes are collected in these.

Recycling: Mechanical processing: Collected waste is passed through processing plant. High speed wind blown through processor. Heavy and light waste and magnetic and non magnetic waste is separated. Recycling of paper, steel and metals is done by machines.

Liquid waste treatment:
Following steps are applied:
Primary treatment: Large suspended and floating matter eg. plastic, wood, paper removed by sieving. Suspended matter of small...
size is removed. The suspended materials settle down in the sedimentation tanks. Alum or lime are added to the chambers. These chemical coagulants settle down the suspended materials.

Secondary treatment: The outgoing water from the first chamber is lead into this chamber. The total mass is created and mixed with microbes to produce a biomass which settles down and is free from iron.

Tertiary treatment: The waste water is now passed through clear quartz tubes exposed to intense ultraviolet light.

PT will explain secondary treatment using blackboard

Students will listen carefully

Secondary treatment

The total mass is created and mixed with microbes to produce a biomass which settles down

Tertiary treatment:

The waste water is now passed through clear quartz tubes exposed to intense ultraviolet light

Generalisation: - So, student today we have studied about waste generation, segregation of wastes, use of coloured dustbins to segregate wastes, recycling, primary, secondary and tertiary treatment.

Final Recapitulation

Ques: How is waste segregated?

Ques: Which coloured bin should be used to throw medical waste?

Ques: Define recycling.

Ques: What are the three processes of liquid waste treatment?

Home work

PT will ask the students to write down the process of waste management.
LESSON PLAN NO.7

General Aims: (1) To develop the scientific attitude among the students.
(2) To develop attitude towards environmental education among the students.
(3) To develop clear thinking and environmental awareness among the students.
(4) To develop attitude towards environmental pollution among the students.

Specific Aim: To provide knowledge to students about “Environmental Values and Ethics”.

Pk Assumed: It is assumed that the students will be aware of environment, ecosystem, types of pollution, waste management.

Pk Testing:

Q1. Define Pollution.
Q2. What are the various types of pollution?
Q3. Define Environment.
Q4. What are environmental laws?

Announcement of the Topic:

Well students, today we will study about “Environmental Values and Ethics”

Presentation: Lesson will be developed by the lecture method.

<table>
<thead>
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<tr>
<td>Human rights are commonly understood as &quot;inalienable fundamental rights to which a person is inherently entitled simply because she or he is a human being.&quot; Human rights are thus conceived as universal (applicable everywhere) and egalitarian (the same for everyone). These</td>
<td>PT will explain human rights using blackboard</td>
<td>Students will listen carefully</td>
<td>Human rights are fundamental rights to which a person is inherently entitled simply because she or he is a human being.</td>
</tr>
</tbody>
</table>
rights may exist as natural rights or as legal rights, in both national and international law. Guidelines/rules formulated by the government to protect our environment are called environmental laws. Norms that have been formed by the government to protect environment are called Environmental Laws. FWPCA Law prevents the industries from discharging waste effluents into water bodies. Fundamental duties: Article 51 A of the constitution states that “It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and have compassion for living creatures.” Child welfare: Child labour below 14 years has been banned by the government. Child labour refers to the employment of children at regular and sustained labour. This practice is considered exploitative by many international organizations and is illegal in many countries.

| PT will explain environmental laws using blackboard | Students will listen carefully | Guidelines/rules formulated by the government to protect our environment are called environmental laws. FWPCA Law prevents the industries from discharging waste effluents into water bodies.

Fundamental duties: Article 51 A

Child welfare: Child labour has been banned by the government

| PT will explain fundamental duties using blackboard | Students will listen carefully | Fundamental duties:

Child welfare: Child labour has been banned by the government

| PT will explain child welfare and child labour using blackboard | Students will listen carefully |

Generalisation: So students today we have studied about environmental laws, human rights, fundamental duties and child labour.
Final Recapitulation

Ques: Define Environmental laws.

Ques: Which law prevents disposing waste effluents into water bodies?

Ques: Which article deals with environment protection?

Ques: What is child labour?

Home work

PT will ask the students to write a short note on environmental laws.