Computer assisted instructions on Environmental education for 9th class
INSTRUCTIONS

Read each frame of C.A.I. Programme Carefully
Write your response within the blank space
in each frame.
Check your response.
If your response is correct proceed to next frame.
If your response is wrong, re-read the wrong
frame but donot cross the responses written
by you.
Environment is the aggregate of abiotic (non living) factors as land, water, atmosphere and biotic factors as living organisms.
The circumstances or conditions that surround an organism are termed as________

(Environment)
An ecosystem consists of a community and its environment. The living organisms in the pond, the water in it, the stones and the mud at the bottom make up an ecosystem.
ON THE BASES OF LOCATION ECOSYSTEMS ARE OF TWO MAIN TYPES AS SHOWN IN THE DIAGRAM: AQUATIC AND **TERRESTRIAL**
THE TREES FORM A CANOPY OVER THE REST OF VEGETATION IN THE FOREST ECOSYSTEM.
THE TREES GROW TALL WITH DIVERSITY IN PLANTS AND ANIMALS AND THERE IS GOOD RAINFALL IN ________________ ECOSYSTEMS.

(FOREST)
Grasslands are characterised by low growing plants and a few scattered trees. Tree growth is limited by regular periods of drought, grazing and occasional fires. Tropical savannahs and prairies of North America are examples of ________Ecosystem.

(Grassland)
Deserts are the driest of all ecosystems. Desert plants and animals are adapted to the arid conditions. In plants, leaves are reduced to spines. Cactus is well adapted to ___________ ecosystem (Desert)
Fresh water ecosystems are of two main types i.e. flowing water (lotic systems) and standing (lentic systems). Stagnant water of lakes and ponds form __________ system (lentic).
Marine organisms are of 3 main types Plankton – free floating incapable of swimming
Nekton - stronger swimming species and
Benthos - bottom dwelling species
The above picture shows ___________ species (nekton)
Estuarine /Brackish Coastal Ecosystem consists of shallow, partially enclosed areas where freshwater and sea water meet and mix. Organic activity is high due to abundant nutrients. Mangroves are found in shallow areas where freshwater and sea water meet and mix so they are adapted to________ ecosystem

(Estuarine/Brackish Coastal ecosystems)
• Physical/Abiotic Factors like climate, soil, topography affect the distribution of organisms in ecosystem leading to interaction between biotic and abiotic components of ecosystem.
• Temperature light, wind, altitude are examples of_________component of ecosystem.
• (Abiotic)
• __________prepare their own food using an external energy source.
• (Autotrophs)
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 _________Animal
(Carnivorous)
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.

- The above diagram shows different organisms of an ecosystem linked together by their nutritional requirements. It is an example of________
- (Food Chain)
The diagram shows networks of a number of food chains existing in an ecosystem form a food web. It is an example of ________
(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 another ________ (Trophic level)
The above diagram shows the circulation of water in the environment.
The circulation of carbon in the environment is termed as ________

(carbon cycle)
The above diagram depicts the circulation of __________ in the environment.

(Nitrogen)
Resources are categorised as renewable and nonrenewable.

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

- Nonrenewable:
  - Fossil Fuels
    - Oil
    - Coal
    - Natural Gas
  - Metallic Minerals
    - Iron
    - Copper
    - Aluminum
  - Nonmetallic Minerals
    - Salt
    - Phosphates

(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 renewable or inexhaustible and do not cause environmental pollution. Moreover they do not require heavy expenditure.

The given diagram depicts various types of _____________________

(Non conventional/ Renewable sources of energy)
1. Wind Energy:
Wind power is harnessed by setting up a windmill which is used for pumping water, grinding grain and generating electricity. The gross wind power potential of India is estimated to be about 20,000 MW, wind power projects of 970 MW capacities were installed till March. 1998. Areas with constantly high speed preferably above 20 km per hour are well-suited for harnessing wind energy.

The given picture shows

(wind mill)
• **2. 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. It is estimated that India possesses 8000-9000 MW of tidal energy potential. The Gulf of Kuchchh is best suited for ________ energy.

• (tidal)
• 3. Solar Energy:
• Sun is the source of all energy on the earth. It is most abundant, inexhaustible and universal source of energy. All other sources of energy draw their strength from the sun. India is blessed with plenty of solar energy because most parts of the country receive bright sunshine throughout the year except a brief monsoon period. India has developed technology to use __________energy for cooking, water heating, water dissimilation, space heating, crop drying etc.

• (solar)
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 ________ source.

(Geothermal energy)
• **Importance of non-conventional sources of energy:**

• 1. The non-conventional sources of energy are abundant in nature. According to energy experts the non-conventional energy potential of India is estimated at about 95,000 MW.

• 2. These are renewable resources. The non-conventional sources of energy can be renewed with minimum effort and money.

• 3. ___________ sources of energy are pollution-free and eco-friendly

• (Non conventional)
Pollution is the introduction of contaminants, created by human actions and also be a result of natural disasters, into a natural environment that causes instability, disorder, harm or discomfort to the living organisms. 

A pollutant is defined simply as any waste material that pollutes water, air or soil. There are 3 factors which determine the severity of a particular pollutant: its chemical nature, its concentration and its persistence.
• **Air pollution** is the introduction of chemicals, particulate matter, or 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.

• ________ pollution leads to severe breathing problems.
• **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 compounds.

• __________ pollution leads to the decrease or even extinction of water dwelling species.

• (Water)
• **Land pollution** is the demolition of Earth's land surfaces often caused by human activities and their misuse of land resources. It occurs when waste is not disposed properly. Health hazard disposal of urban and industrial wastes, exploitation of minerals, and improper use of soil by inadequate agricultural practices are a few factors. Urbanization and industrialization are major causes of pollution. The Industrial Revolution set a series of events into motion which destroyed natural habitats and polluted the environment, causing diseases in both humans and many other species of animals.

• (land)
Growth of human population leads to habitat deterioration. The above diagram shows more __________growth in developing countries.

(Population)
Natural forest fires and manual cutting of trees destroy the ecosystem. Clearing the forests, forest fires lead to **Destruction** of the ecosystem.

(Destruction)
• The growth of industries besides human development has lead to pollution. Acid rain is one of the results of ________ (Industrialisation)
• Growth of cities and construction of dwelling units has lead to environmental problems. Increased garbage dumps, water borne diseases, reduced forest cover are the consequences of growing cities also termed as ________________

(Urbanisation)
Development has lead to new modes of transport which release pollutants as carbon dioxide, carbon monoxide, nitrogen oxides, hydro carbons, sulphur oxides, lead, suspended particulate matter. Transport leads to increased noise and air pollution.
Overexploitation of natural resources due to human activity lead to pressures and intruding on natural habitat. This is termed as encroachment.

The given pictures illustrate felling of trees for human benefits, this is an example of ___________

(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.

_________ cultivation leads to reduced fertility of the soil.

(Shifting)
• Development of facilities for tourism, pilgrimage, recreation and adventure also leads to ecosystem damage. Violation of rules lead to environmental disturbance.

• Poaching is one of the hazards caused by increased__________

• (Tourism)
• 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.

The given picture Depicts a ________

(Dam)
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 _______ to marine environment.

- (water pollution)
• 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 ________ caused by radiations.
• (pollution)
• 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 _______ of living species.
• (habitat)
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. Environmental, social and economic are three spheres of sustainability.

The Three Spheres of Sustainability

- **Social**: Standard of Living, Education, Community, Equal Opportunity
- **Environmental**: Natural Resource Use, Environmental Management (air, water, land, waste)
- **Economic**: Profit, Cost Savings, Economic Growth, Research & Development

Adapted from the 2002 University of Michigan Sustainability Assessment
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 ___________ wildlife.

(conserve)
• IUCN-International Union for conservation of nature and natural resources.
• WWF-World wildlife fund focuses on conservation of wildlife.

• Expand WWF_______________________
• (World Wildlife Fund)
Growing two or more crops on the same piece of land alternatively so as to replenish the fertility of soil is called crop rotation.

Crop rotation is an example of _________ of agriculture.

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

The above diagrams depict growing two crops alternatively. It is known as __________ (Crop rotation)
Planting two or more crops at the same time side by side to maintain the fertility of soil is called mixed cropping.

- The given picture shows paddy n brassica planted at the same time it is an example of ________
  - (mixed cropping)
ORGANIC FARMING

Only green manures are used in organic farming. Biofertilisers are used and biological control of pests 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 as ____________

• (Vermicomposting)
5. Energy from Biomass:

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.

(biomass)
Peelings of fruits, cowdung, dried leaves, leftover fodder is fermented in the absence of air and presence of water to produce methane rich biogas. This biodegradation is done in special chambers and _______ is collected via pipes. It can be used for cooking, lighting. The leftover slurry is a good manure (Biogas)
Liquified Petroleum Gas is a hydrocarbon fuel, lighter than petroleum. Can be used as automotive fuel. Full form of LPG is ____________ (Liquefied Petroleum Gas)

<table>
<thead>
<tr>
<th>CNG</th>
<th>LPG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressed Natural Gas is a domestically available, economical, clean burning, alternative fuel source for vehicles.</td>
<td>LPG or Liquefied Petroleum Gas is a hydrocarbon fuel, lighter than petroleum that can be used as an automotive fuel.</td>
</tr>
<tr>
<td>Higher initial investment</td>
<td>Lower initial investment</td>
</tr>
<tr>
<td>Lower running costs</td>
<td>Higher running costs</td>
</tr>
<tr>
<td>Lesser power delivery</td>
<td>Increased power delivery</td>
</tr>
<tr>
<td>Lesser tune-ups required</td>
<td>More refined</td>
</tr>
<tr>
<td>Bulkier and heavier storage tanks</td>
<td>Smaller and lighter storage tanks</td>
</tr>
<tr>
<td>Limited availability</td>
<td>Far better availability</td>
</tr>
<tr>
<td>No carbon deposits = fewer oil changes</td>
<td>Cleaner emissions</td>
</tr>
<tr>
<td>Safer : it is lighter and has a higher ignition temp</td>
<td>Heavier and has a lower ignition temperature</td>
</tr>
<tr>
<td>More popular with commercial vehicles</td>
<td>More popular with private vehicles</td>
</tr>
</tbody>
</table>
Compressed Natural Gas is a domestically available, economical, clean burning, alternative fuel source for vehicles

Full form of CNG is ________________

(Compressed Natural Gas)
Using the available energy efficiently is termed as energy conservation.

The picture depicts use of energy efficiently. It is known as ____________ (conservation of energy pyramid)
The picture depicts different types of wastes.

- Solid waste
- Sludge
- Liquid waste
- Hazardous "waste"
- Ash
- Spray-drift odour
- Gaseous and odorous waste

(wastes)
<table>
<thead>
<tr>
<th>Waste Type</th>
<th>Phase</th>
<th>Treatment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Alkali, Waste acid and waste emulsion liquid</td>
<td>liquid</td>
<td>physical/chemical treatment → stabilization/solidification → landfill,</td>
</tr>
<tr>
<td>heavy metal containing waste sludges</td>
<td>semi-solid/solid</td>
<td>stabilization/solidification → landfill</td>
</tr>
<tr>
<td>Medical waste, waste paint and dye, distillation residues, waste organic resins</td>
<td>liquid, semi-solid/solid</td>
<td>incineration</td>
</tr>
<tr>
<td>Fly ash and bottom ash</td>
<td>solid</td>
<td>Secure landfill or/solidification → Secure landfill</td>
</tr>
<tr>
<td>waste asbestos</td>
<td>solid</td>
<td>Secure landfill</td>
</tr>
</tbody>
</table>
Recycling of paper also leads to conservation of forest trees.

The diagram depicts cycling of ________ (paper)
The given diagram depicts the recycling process.

1. The average person produces almost one ton of waste per year.
2. Most of this waste is collected and deposited in a municipal landfill.
3. Over time, waste generates landfill gas which contains greenhouse gases and chemicals that contribute to water and air pollution.
4. Landfill gas is energy that can be processed to provide earth-friendly energy.
5. Your community wins by gaining cleaner air and water, more jobs, and a local source of renewable energy.
The given diagram depicts recycling of steel.
The given diagram depicts waste treatment for waste water.
There are two common meanings of the term "greenhouse effect". 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).

• (coal)
Greenhouse gases reduce the rate at which the Earth's surface loses infrared radiation to outer space. Because one way to increase the temperature of anything is to reduce its rate of energy loss to its surroundings, this makes the Earth's surface and lower atmosphere warmer than they would otherwise be.

You can think of greenhouse gases as sort of a "blanket" for infrared radiation -- they keep the Earth's surface and lower layers of the atmosphere warmer, and the upper layers colder, than if the greenhouse gases were not there.

About 80-90% of the Earth's natural greenhouse effect is due to water vapor and clouds. Most of the rest is due to carbon dioxide, methane, and a few other minor gases. While the remaining gases in the atmosphere (e.g. nitrogen, oxygen) also absorb and emit a small amount of infrared radiation, their radiative effect on temperature is so weak that they can be neglected. While methane is a much more potent greenhouse gas than carbon dioxide, but ________is present in larger percentage in atmosphere so it leads to most of man made greenhouse effect.

(Carbon dioxide)
The given diagram shows _______ effect.

(Green house)
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. For example, there may be an impermeable clay layer below the soil. It also occurs on areas that are poorly drained topographically. What happens is that the irrigation water (and/or seepage from canals) eventually raises the water table in the ground -- the upper level of the groundwater -- from beneath. Growers don't generally realize that waterlogging is happening until it is too late -- tests for water in soil are apparently very expensive.

The raised water table results in the soils becoming waterlogged. When soils are water logged, air spaces in the soil are filled with water, and plant roots essentially suffocate -- lack oxygen.

___________ also damages soil structure.

(Water Logging)
• **Global warming** is the rising average temperature of Earth's atmosphere and oceans since the late 19th century and its projected continuation. Since the early 20th century, Earth's average surface temperature has increased by about 0.8 °C (1.4 °F), with about two thirds of the increase occurring since 1980.

• Warming of the climate system is unequal, and scientists are more than 90% certain that most of it is caused by increasing concentrations of greenhouse gases produced by human activities such as deforestation and the burning of fossil fuels.

• The phenomenon of unequal rise in temperature of earth’s surface due to human activities like pollution and deforestation is called as___________.

• (global warming)
• **Eutrophication** (Greek: *eutrophia*—healthy, adequate nutrition, development; German: *Eutrophie*) or more precisely **hypertrophication**, is the ecosystem response to the addition of artificial or natural substances, such as nitrates and phosphates, through fertilizers or sewage, to an aquatic system.

Nitrogen and _______ fertilizers cause Eutrophication.

• **Phosphorus**

---

[Diagram of Eutrophication process]
• One example is the "bloom" or great increase of phytoplankton in a water body as a response to increased levels of nutrients. Negative environmental effects include hypoxia, the depletion of oxygen in the water, which induces reductions in specific fish and other animal populations. Other species (such as Nomura's jellyfish in Japanese waters) may experience an increase in population that negatively affects other species.

• The picture depicts growth of algal species as an effect of eutrophication it is termed

• as______________

• (Algal Bloom)
Depletion of ________ leads to mortality of aquatic organisms due to eutrophication.

(Oxygen)
The given diagram illustrates the process of eutrophication.
• **Human rights** are commonly understood as "inalienable fundamental rights to which a person is inherently entitled simply because she or he is a human being."

• Human rights are thus conceived as universal (applicable everywhere) and egalitarian (the same for everyone). These rights may exist as natural rights or as legal rights, in both national and international law.

The given logos depict ________
(human rights association)
• Guidelines/rules formulated by the government to protect our environment are called environmental laws. 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.”
Norms that have been formed by the government to protect environment are called____________
Law prevents the industries from discharging waste effluents into water bodies (FWPCA)
• **Child labour** refers to the employment of children below 14 years of age at regular and sustained labour. This practice is considered exploitative by many international organizations and is illegal in many countries. Child labour was employed to varying extents through most of history, but entered public dispute with the advent of universal schooling, with changes in working conditions during the industrial revolution, and with the emergence of the concepts of workers' and children's rights.

The picture shows children below 14 years working. It is ________ (Child labour)