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ENVIRONMENTAL SCIENCE

N-333

**Chapter wise Reference Book
Including Many Solved Sample Papers**

Based on

N.I.O.S. Class – XII
National Institute of Open Schooling

By : Dheeraj



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Based on: NATIONAL INSTITUTE OF OPEN SCHOOLING - XII

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**Sample Preview
of the
Solved
Sample Question
Papers**

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Solved Sample Paper - 1

Based on NIOS (National Institute of Open Schooling)

Environmental Science - XII

Time : 3 Hours

Maximum Marks : 100

- Note :** (i) This Question Paper consists of two Sections – Section ‘A’ and Section ‘B’.
(ii) All the questions of Section ‘A’ are compulsory.
(iii) Candidates are given a choice in Section ‘B’. They are required to attempt the questions either from ‘Option-I’ or ‘Option-II’.
(iv) Marks of each question are indicated against it.

SECTION - A

Q. 1. State the planet that has no atmosphere.

Ans. Mercury is the only planet in our solar system that has no substantial atmosphere.

Q. 2. List the Indian States, where shifting cultivation is still practiced.

Ans. The states of Assam, Manipur, Meghalaya Nagaland, Tripura, Arunachal Pradesh and Mizoram, are all hilly states and shifting cultivation is largely practiced in these hilly states.

Q. 3. “Improper sewage systems in the cities affect quality of water.” Give the reasons for this statement.

Ans. Sanitation is the worst problem facing the city which needs to be solved otherwise the city will be on the risk of water born diseases.

Q. 4. What is ecological footprint?

Ans. The ecological footprint measures human demand on nature.

Q. 5. Pick up the steps involved in the carbon cycle :

Assimilation, Respiration, Combustion, Atmospheric fixation, Condensation, Photosynthesis, Ammonification, Evaporation, Transpiration.

Ans. In the global carbon cycle, we include photosynthesis, respiration, decomposition and combustion.

Q. 6. Differentiate the music played at your room and at the party hall through the loudspeaker. Can the music become noise? Mention the optimum noise level.

Ans. Yes, the music can become the noise when it is unpleasant, unpitched and uncontrolled. In general sound above 85 (db, decibels) are harmful.

Q. 7. Sex ratio in Kerala and Pondicherry is 1058 and 1001 respectively whereas it is very poor in Delhi (821) and Chandigarh (773). What does poor sex-ratio of a state or country suggestive of?

Ans. The poor sex ratio of any state or country suggestive of discrimination. Sex ratio of a population should remain more or less constant or balanced and if it is not same then that is sign of discrimination against female child, social presume, female foeticide, etc.

Q. 8. Mention any four strategies to cope with greenhouse effect.

Ans. By using the following ways we can cope with the effect of green house:

1. Reduce, reuse, recycle.
2. Use less heat and air conditioning.
3. Plant a tree.
4. Drive less and drive smart.

Q. 9. Define the exotic species. Give any two examples.

Ans. Exotic species are organisms that are introduced to a region or ecosystem often unintentionally, through human migration of trade. Some exotic species are useful to man. Such as horses, goats pigs and edible plants including – wheat and oats.

Q. 10. Golden rice is nutritionally superior over the normal rice. Justify.

Ans. Ref.: See Chapter-21, Page No. 128, Q. No. 4 (Intext Questions 21.3).

Q. 11. What is meant by corporate environmental ethics?

Ans. Environmental ethics is formally defined as the study of human interaction with nature. In a corporate sense environmental ethics is concerned with a company’s responsibility to protect the environment in which it operates.

Q. 12. Last week you and your class students visited Sulabh International Museum of Toilets as a part of a series of educational visits. State the work undertaken by this organization to your friends.

Ans. Ref.: See Chapter-25, Page No. 149, Q. No. 5 (Intext Questions 25.5).

Q. 13. Year after year we are observing a reduction in the rainfall in our country. Environmental scientists believe this is because of environmental degradation caused by excessive use of natural resources. Mention four human activities that have lead to this degradation.

Ans. Human activities which are responsible for degradation of rainfall:

1. Green house gas emissions.
2. Deforestation.
3. Air pollution.
4. Negligence of ecosystem.

Q. 14. 'We two ours two' is India's population policy. Discuss the need for this policy by highlighting any four important impacts of increasing population on environment in India.

Ans. Ref.: See Chapter-3, Page No. 14, Q. No. 3 (Terminal Questions).

Q. 15. One of the major problems our country facing is that people are migrating from rural to urban areas. Give reasons for this migration.

Ans. Ref.: See Chapter-3, Page No. 15, Q. No. 7.

Q. 16. Identify the type of pollution and discuss any four measures to prevent and control the pollution caused by burning crackers on festival like Diwali.

Ans. By the burning crackers on Diwali causes the air pollution. We can prevent this air pollution by following tips:

1. Select ecofriendly crackers.
2. Dispose off waste properly after celebration.
3. Limitation of using fire crackers.
4. Avoid the electric light use diyas.

Q. 17. It is estimated that every hour nearly 17 people die of road accidents in India. Write down any four measures to prevent road accidents.

Ans. Measures taken to reduce road accidents are:

1. Strict rules should be apply to avoid road accidents.
2. Heavy fine should be taken from the violators like drunk driving.
3. Use of speed detection devices-over speeding is one reasons for road accidents in India.
4. Reducing corruption: Another reasons for increasing traffic violations neas that the rules and regulations were not imposed in a proper manner with the introduction of E-Challan and almost no use of cash for the payment of traffic violation fines combined with increased penalties, corruption has started reducing.

Q. 18. Write short notes on the following international environmental agencies:

(a) United Nations Environment Programme (UNEP)

Ans. Ref.: See Chapter-25, Page No. 149, Q. No. 4 (Intext Questions 25.5).

(b) Food and Agriculture Organization of the United Nations (FAO)

Ans. Ref.: See Chapter-25, Page No. 150, Q. No. 6 (iv).

Q. 19. List the name of five processes in nitrogen cycle and describe any two processes in detail.

Ans. There are five main processes which is essential for nitrogen cycle. First is nitrogen fixation which involves conversion of gaseous nitrogen into ammonia. Atmospheric nitrogen can be fixed by the three methods of atmospheric fixation, industrial fixation, bacterial fixation. There are two types of bacteria, namely, symbiotic bacteria (e.g. Rhizobium in the root nodules of leguminous plants) and free living or symbiotic (e.g. Nostoc, Azobacter, Cyanobacteria). Secondly, there is nitrification in which ammonia is converted into nitrates or nitrites by Nitrosomonas and Nitrococcus bacteria respectively. Thirdly, though the assimilation nitrogen fixed by plants is converted into organic molecules such as proteins, DNA, RNA, etc. Fourth process is ammonification whereby living organisms produce nitrogenous waste products such as urea and uric acid. And finally the denitrification is conversion of nitrates back into gaseous nitrogen and is the fifth important process of the nitrogen cycle.

Q. 20. 'Think globally and act locally' is a golden rule for protecting our environment. As a responsible citizen of this country, write down the measures you can take towards the same.

Ans. Think globally act locally urges people to consider the health of the entire planet and to take action in their own communities and cities. Long before governments began enforcing environmental laws, individuals were coming together to protect habitats and organisms that live with in them. Focus on your local environment and your small acts will add up, slowly leading to change your country. This idea has traditionally been associated with the environment and sustainability, but it can be applied on much and more. It is time for us to consider what "think globally, act locally."

Q. 21. Of late you find that many people promoting the use of organic food products. Discuss the benefits of organic farming.

Ans. Benefits of Organic Farming: Foods from organic farming are loaded with nutrients such as vitamins, enzymes minerals and other micro nutrients compared to those from conventional farms. This is because organic famrs are managed and downshed using sustainable practices. The conclusion was that food items from organic farming had way more nutrient than those sourced from commercial or conventional forms.

Sample Preview of The Chapter

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ENVIRONMENTAL SCIENCE

Based on: NATIONAL INSTITUTE OF OPEN SCHOOLING - XII

MODULE-1

ENVIRONMENT THROUGH AGES

Origin of Earth and Evolution of the Environment



SUMMARY

Earth, our home planet, is a beautiful blue and white ball when seen from space. The third planet from the Sun, it is the largest of the inner planets. Earth is the only planet known to support life and to have liquid water at the surface. Earth has a substantial atmosphere and magnetic field, both of which are critical for sustaining life on Earth. Earth is the innermost planet in the solar system with a natural satellite – our Moon.

All existing matter, space and other phenomena constitute the universe. In other words, everything that exists anywhere is included in the universe.

The Solar System includes dozens of moons and countless pieces of rocky and icy debris along with planets. The Sun is one of the hundreds of billions of stars that form our galaxy, the Milky Way. There are several hundreds of billions of galaxies in the universe, and scientists see them in every direction of the sky.

We live on Earth, the third planet of our solar system. Our solar system is located in the Galaxy. Our solar system consists of the sun, planets, moons, an asteroid belt, comets, meteors, and other objects. The sun is the center of our solar system; the planets, over 61 moons, the asteroids, comets, meteoroids and other rocks and gas all orbit the Sun. The Earth is the third planet from the sun in our solar system.

The solar system consists of the Sun; the eight official planets, at least three “dwarf planets”, more than 130 satellites of the planets, a large number of small bodies (the comets and asteroids), and the interplanetary medium.

The inner solar system contains the Sun, Mercury, Venus, Earth and Mars. The planets of the outer solar system are Jupiter, Saturn, Uranus, and Neptune (Pluto is now classified as a dwarf planet).

The Earth is our home, and is the only planet in the solar system with exactly the conditions required to support life. The earth is thought to have formed about 4.6 billion years ago along with the rest of the solar system, and since its beginnings the Earth has been a unique planet. The Earth is the only planet in the solar system with water in a liquid form, covering about 71% of its surface. Unlike the other planets in our solar system, the amount of energy Earth receives from the Sun generates a climate ideal for life. The Earth experiences very diverse weather patterns because of its atmosphere and the constant circulation of air due to its rotation. Earth’s atmosphere is unlike any other planet’s, and has played an instrumental role in Earth’s ability to sustain life. It is generally assumed that planets are formed by the accretion of gas and dust in a cosmic cloud, but there is no way of estimating the length of this process. In the standard theory, space and time and all the matter and energy in the universe were formed in the Big Bang some 15 to 20 billion years ago. The conditions in the rapidly expanding and cooling universe following the Big Bang were such that only simple matter was formed. The universe was filled with hydrogen (H) and small amounts of helium (He). As the universe expanded, galaxies formed in areas of higher concentrations of H and He and stars formed within the galaxies in areas of highest concentrations of H and He.

A cloud of gas formed by a great initial explosion may have given rise to the universe, and the earth may

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have been formed from a small part of that cloud. Once the energy from the explosion grew weaker, the forces of attraction made the cloud of gas thicken, forming countless gaseous spheres of every size. In the spheres, the attraction among the particles of the gas continued to thicken the matter. Pressures great enough to set off an atomic explosion were created inside the largest spheres. They exploded like bombs, and the stars were created.

In the smaller spheres, there was only enough pressure to form glowing balls of matter. This was the beginning of fiery heavenly bodies, planets like earth, which would one day cool.

The term “environment” means the surroundings of a living creature. It can also refer to all the factors of the external world that affect biological and social activities. There are abiotic (non-living) environmental factors such as sunlight, air, and water. There are also biotic (living or recently living) environmental factors such as plants, animal predators, and food. The total environment of an organism is the sum total of the biotic and abiotic environments. The study of the relationships between living creatures and their environments is called ecology. A human’s abiotic environment includes things such as weather (sun-light, wind, air temperature) and items which give protection from the weather (clothes or houses). Other abiotic factors are the soil and water, and chemicals in the soil and water. A human’s biotic environment includes things such as food (plants and animals), other humans, animals, trees, and grasses. The biotic environment also includes how living creatures interact with each other and their abiotic environments.

The environment broadly includes living and non-living components.

Biotic component: Biotic components are the living things that shape an ecosystem. A biotic factor is any living component that affects another organism, including animals that consume the organism in question, and the living food that the organism consumes. Biotic factors include human influence.

Biotic components are contrasted to abiotic components, which are non-living components of an organism’s environment, such as temperature, light, moisture, air currents, etc.

Abiotic components are non-living chemical and physical factors in the environment. Abiotic phenomena underlie all of biology. Abiotic factors, while generally downplayed, can have enormous impact on evolution. Abiotic components are aspects of geo diversity.

INTEXT QUESTIONS 1.1

Q. 1. Approximately how old is the earth?

Ans. The generally accepted age for the earth and the rest of the solar system is about 4.55 billion years (plus or minus about 1%).

Q. 2. Name the star around which the earth revolves along with other planets of the solar system.

Ans. Our solar system is an awesome sight and contains an array of planets, moons, stars, comets, and asteroids, along with the Sun. All of the planets in the solar system revolve around the Sun, which is itself a giant star.

Q. 3. What do you mean by “solar system”?

Ans. The solar system is made up of all the planets that orbit our Sun. In addition to planets, the solar system also consists of moons, comets, asteroids, minor planets, and dust and gas. Everything in the solar system orbits or revolves around the Sun.

Q. 4. Why does the day and night cycle consist of only 24 hours?

Ans. As the earth spins one side is facing towards the sun and the other side is facing away from the sun. The earth spins and the side of the earth that faced the sun now faces away. It takes 24 hours for the earth to spin around once.

Q. 5. If you were to view earth from space, which colour would earth reflect?

Ans. Earth is the only planet in our solar system that humans can live on. No other planet has oceans, other life forms, and enough oxygen to comfortably breathe. Because we have so much water, Earth is called the Blue Planet. From space the oceans combined with the atmosphere makes the planet look blue.

INTEXT QUESTIONS 1.2

Q. 1. List the conditions that make earth a unique planet.

Ans. Earth is apparently the only body in our solar system with conditions appropriate for the emergence and continuance of life. Its size and mass prevent its volatile materials from escaping into space and its distance from the sun allows water to exist upon it in solid, liquid, and gaseous forms. Its surface temperature has never been too hot or too cold for life, once it had started to continue. Variables of non-living components are such things as physical and chemical compositions of soil, air, or water; the amount of radiant energy that enters the system; air or water and pressure and movement; ambient temperature range; and seasonal changes in weather.

Q. 2. From where earth gets energy?

Ans. The earth receives almost all its energy from the Sun’s radiation. Sun also has the most dominating influence on the changing climate of various locations on Earth at different times of the year. The Earth receives energy from the Sun in the form UV, visible, and near IR radiation, most of which passes through the atmosphere without being absorbed. Of the total amount of energy available at the top of the atmosphere (TOA), about 50% is absorbed at the Earth’s surface. Because it is warm, the surface radiates far IR thermal radiation that consists of

wavelengths that are predominantly much longer than the wavelengths that were absorbed (the overlap between the incident solar spectrum and the terrestrial thermal spectrum is small enough to be neglected for most purposes). Most of this thermal radiation is absorbed by the atmosphere and re-radiated both upwards and downwards; that radiated downwards is absorbed by the Earth's surface.

Q. 3. Why oxygen is essential for life?

Ans. Respiration is the bodily process of inhalation and exhalation. It is the process of taking in oxygen and releasing carbon dioxide. The process involves the consumption of oxygen and liberation of carbon dioxide and water.

The oxygen inhaled is used to burn/oxidize/break down the food (glucose). This reaction produces energy required for all activities. Water and carbon dioxide are by-products of this reaction. This process occurs inside the mitochondria and is called cellular respiration.

INTEXT QUESTIONS 1.3

Q. 1. Name the gases that were found in the primitive atmosphere.

Ans. In the beginning the Earth was very hot and molten. As it cooled, the first solid rock crust appeared about 4 billion years ago. The atmosphere at that time is believed to have been similar to the atmospheres of Mars and Venus today. They would have contained the gases carbon dioxide, ammonia, methane, hydrogen and water vapour. These gases would have come from volcanoes.

Q. 2. Which were the earliest organisms that evolved on earth?

Ans. The ancestors of modern bacteria were single-celled microorganisms that were the first forms of life to appear on Earth, about 4 billion years ago. For about 3 billion years, all organisms were microscopic, and bacteria and archaea were the dominant forms of life.

Q. 3. How did oxygen come into atmosphere?

Ans. Oxygen has not always been as abundant as it is today. Most scientists believe that for half of Earth's 4.6-billion-year history, the atmosphere contained almost no oxygen. Cyano bacteria or blue-green algae became the first microbes to produce oxygen by photosynthesis, perhaps as long ago as 3.5 billion years ago and certainly by 2.7 billion years ago.

Q. 4. Name the five kingdoms of life.

Ans. Every living creature on Earth belongs to a kingdom. Scientists debate how many kingdoms there are, but most agree there are five. Here is how the five kingdoms are organized.

Monera: Monera are single-celled organisms that don't have a nucleus. Bacteria make up the entire kingdom.

Protists: Protists are mostly single-celled organisms that have a nucleus. They usually live in water. Some protists move around, while others stay in one place. Examples of protists include some algae, paramecium, and amoeba.

Fungi: Fungi are usually motionless organisms that absorb nutrients for survival. They include mushrooms, molds, and yeasts.

Plants: Plants contain chlorophyll, a green pigment necessary for photosynthesis, a process in which plants convert energy from sunlight into food. Their cell walls are made sturdy by a material called cellulose, and they are fixed in one place. Plants are divided into two groups: flower- and fruit-producing plants and those that don't produce flowers or fruits. They include garden flowers, agricultural crops, grasses, shrubs, ferns, mosses and conifers.

Animals: Animals are the most complex organisms on Earth. Animals are multi-celled organisms, eat food for survival, and have nervous systems. They are divided into vertebrates and invertebrates and include mammals, amphibians, reptiles, birds and fish.

INTEXT QUESTIONS 1.4

Q. 1. Define environment.

Ans. Environment literally means surrounding and everything that affect an organism during its lifetime is collectively known as its environment. In another words "Environment is sum total of water, air and land interrelationships among themselves and also with the human being, other living organisms and property". It includes all the physical and biological surrounding and their interactions. Environmental studies provide an approach towards understanding the environment of our planet and the impact of human life upon the environment.

Q. 2. Name its biotic components.

Ans. Biotic components include producers, consumers and decomposers. Producers are also called autotrophs and consist of plants which convert the energy into food. Consumers are the biotic components which are also known as heterotrophs and consist of animals. They depend upon producers for food which provides them energy. Finally, decomposers, also called detritivores, consist of fungi and bacteria. These biotic components break down chemicals from producers and consumers into simpler form which can be reused by other biotic components.

Q. 3. List its abiotic components.

Ans. The abiotic components are of the environment are the non-living chemical and physical factors affecting our ecosystems on the earth. We can classify abiotic components as soil, air, water, light or radiation and temperature. It has been observed that the macroscopic climate often influences each of these factors.

Q. 4. In a sentence, mention why environmental degradation should be prevented.

Ans. Environmental degradation is a serious threat to the lives of people, animals and plants, making it imperative that we stop further degradation from occurring.

TERMINAL EXERCISES

Q. 1. Trace the origin of the earth.

Ans. The earth is estimated to be 4.5 billion to 5 billion years old, based on radioactive dating of lunar rocks and meteorites, which are thought to have formed at the same time. The origin of the earth continues to be controversial. Among the theories as to its origin, the most prominent are gravitational condensation hypotheses, which suggest that the entire solar system was formed at one time in a single series of processes resulting in the accumulation of diffuse interstellar gases and dust into a solar system of discrete bodies. Older and now generally discredited theories invoked extraordinary events, such as the gravitational disruption of a star passing close to the sun or the explosion of a companion star to the sun.

Earth, along with the other planets, is believed to have been born 4.5 billion years ago as a solidified cloud of dust and gases left over from the creation of the Sun. For perhaps 500 million years, the interior of Earth stayed solid and relatively cool, perhaps 2,000°F. The main ingredients, according to the best available evidence, were iron and silicates, with small amounts of other elements, some of them radioactive. As millions of years passed, energy released by radioactive decay—mostly of uranium, thorium, and potassium—gradually heated Earth, melting some of its constituents. The iron melted before the silicates, and, being heavier, sank toward the center. This forced up the silicates that it found there. After many years, the iron reached the center, almost 4,000 mi deep, and began to accumulate. No eyes were around at that time to view the turmoil that must have taken place on the face of earth—gigantic heaves and bubbleings on the surface, exploding volcanoes and flowing lava covering everything in sight. Finally, the iron in the center accumulated as the core. Around it, a thin but fairly stable crust of solid rock formed as earth cooled. Depressions in the crust were natural basins in which water, rising from the interior of the planet through volcanoes and fissures, collected to form the oceans. Slowly, earth acquired its present appearance.

Q. 2. Describe briefly the solar system to which the earth belongs.

Ans. Solar system consists of the sun and the eight planets which revolve around it and it also includes satellites of the planets, asteroids and meteors. It is part of the galaxy called the Milky Way. Our earth is the only planet in the solar system supporting life and is about 28,000 light years from the galactic center.

Q. 3. State the big bang theory of origin of universe.

Ans. The Big Bang theory is the prevailing cosmological model that describes the early development of the Universe. According to the Big Bang theory, the Universe was once in an extremely hot and dense state which expanded rapidly. This rapid expansion caused the Universe to cool and resulted in its present continuously expanding state. According to the most recent

measurements and observations, the Big Bang occurred approximately 13.75 billion years ago, which is thus considered the age of the Universe. After its initial expansion from a singularity, the Universe cooled sufficiently to allow energy to be converted into various subatomic particles, including protons, neutrons, and electrons. While protons and neutrons combined to form the first atomic nuclei only a few minutes after the Big Bang, it would take thousands of years for electrons to combine with them and create electrically neutral atoms. The first element produced was hydrogen, along with traces of helium and lithium. Giant clouds of these primordial elements would coalesce through gravity to form stars and galaxies, and the heavier elements would be synthesized either within stars or during supernovae.

The Big Bang is a well-tested scientific theory and is widely accepted within the scientific community. It offers a comprehensive explanation for a broad range of observed phenomena. Since its conception, abundant evidence has been uncovered in support of the model. As the distance between galaxy clusters is increasing today, it can be inferred that everything was closer together in the past. This idea has been considered in detail back in time to extreme densities and temperatures, and large particle accelerators have been built to experiment in such conditions, resulting in further development of the model. On the other hand, these accelerators have limited capabilities to probe into such high energy regimes.

Q. 4. Why is earth able to sustain life while no other planet is known to have life?

Ans. A planet that can sustain life is termed habitable, even if life did not originate there. The Earth provides liquid water—an environment where complex organic molecules can assemble and interact, and sufficient energy to sustain metabolism. The distance of the Earth from the Sun, as well as its orbital eccentricity, rate of rotation, axial tilt, geological history, sustaining atmosphere and protective magnetic field all contribute to the current climatic conditions at the surface.

Earth is currently the only planet known to support life in any form. Because of the existence of millions or billions of other planets, and the fact that we have not—indeed, cannot—inspect all of them means we will never know for sure the exact number that do support life. Many have one or two or some of the necessary conditions for life, but none have so far been discovered (of the few hundred we know) that have all of the necessary factors.

Life on Earth is possible because of a coincidental combination of factors:

The habitable zone: Earth is at the right distance from the Sun to have liquid water on its surface, and for the atmosphere to be at a reasonable temperature for life to occur. It also doesn't stray too far from the optimal distance, making the temperature stable.

Stable planet: We aren't inundated with lava every day. This gives life the chance to happen without being destroyed instantaneously.