MSBTEs Study Material

<Program Code: **CE**>: <Course Code:**22447**>: <Course Name: **Environmental Studies**>: <**Unit-1: Environment**>: <**UO: 1a and UO 1c**>: <**Study Material**>

<**Dr. B. R. Ambade**>	<**03 July 2020**>	<**Dr. D. K. Parbat**>

Key words **Environment, Biotic and Abiotic Components, Scope,**

Learning Objective:

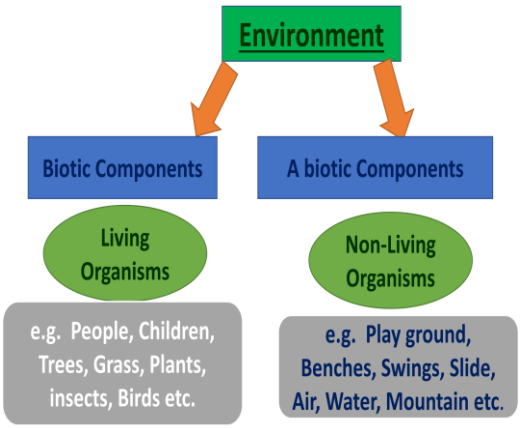
To understand and describe environment, its scope, need and issues in environment. Also to develop public awareness about environment.

Key Questions:

Define environment?
What are the components of environment?
Describe the scope of environment?
Describe the need of environment?

Concept Map:

Diagram/ Picture



Explanation of Concept:

ENVIRONMENT IN SIMPLE WAY:

A place around us includes people, children, benches, ground, grass, trees, insects, birds, sunlight, air, land, water, mountain etc.

Biotic components constantly interact and exchange things with each other as well as with the A-biotic components for their survival and existence.

SCOPE OF ENVIRONMENTAL STUDIES

By studying environmental science, students may develop a breadth of the interdisciplinary and methodological knowledge in the environmental fields that enables them to facilitate the definition and solution of environmental problems. The scope of environmental studies is that, the current trend of environmental degradation can be reversed if people of educated communities are organized and empowered; experts are involved in sustainable development.

The major areas in which the role of environmental scientists are of vital importance are natural resources, ecosystems, biodiversity and its conservation, environmental pollution, social issues and environment human population and environment.

NEED OF ENVIRONMENTAL STUDIES:

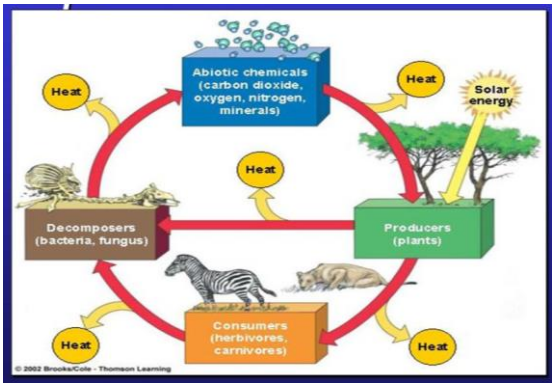
- **Environment Issues Being of International Importance.**
- **Problems Cropped in The Wake of Development.**
- **Explosively Increase in Pollution.**
- **Need for An Alternative Solution.**

Key Definitions/ Formulas:

Environment: Environment means the surrounding external conditions influencing development or growth of people, animal or plants; living or working conditions etc.

Biotic Components means living organism surrounding us like trees, birds, insects, animals, humans, grass etc.

A-Biotic Components means non living things around us like air, water, land, sunlight, mountain, river, ocean.



Interactions of various components of environment

<table>
<tr><td rowspan="2">Solved word Problem:

Answers of above questions are covered in study material.</td><td>• Need To Save Humanity From Extinction.
• Need For Wise Planning of Development.
• Sustainable Development.</td><td></td></tr>
<tr><td>Application of Concept/ Examples in real life:

The concept is useful in understanding the environmental issues and the knowledge shall apply in our day to day life to safeguard the environment.</td><td>Link to YouTube/ OER/ video:

https://youtu.be/7G9eXI_DPn8
Study of Environment</td></tr>
<tr><td colspan="3">Key Take away from this UO:
Understanding the environment and the scope of environment.</td></tr>
</table>

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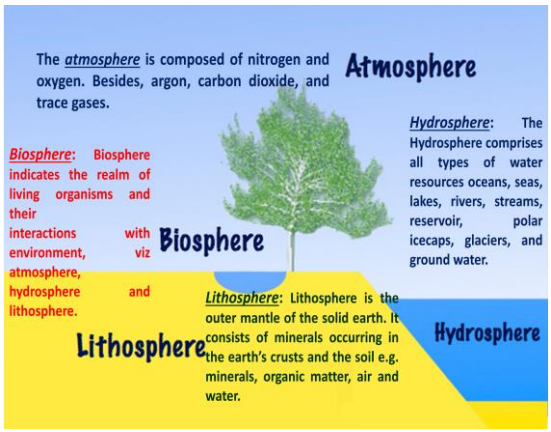
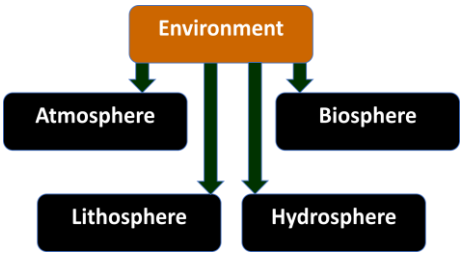
<Program Code: **CE**>: <Course Code:**22447**>: <Course Name: **Environmental Studies**>: < **Unit-1:Environment**>: <**UO: 1b**>: <**Study Material**>

<**Dr. B. R. Ambade**>	<**03 July 2020**>	<**Dr. D. K. Parbat**>
Key words: Environment, Atmosphere, Biosphere, Lithosphere, Hydrosphere	**Learning Objective:** To understand and describe various types of environment.	**Diagram/ Picture** 
Key Questions: **Describe various types of environment .** **Describe segments of environment .**	**Concept Map:** 	
Solved word Problem: Answers of above questions are covered in study material.	**Explanation of Concept**: **SEGMENTS OF ENVIRONMENT:** **Atmosphere:** The atmosphere implies the protective blanket of gases, surrounding the earth. (a) It sustains life on the earth. (b) It saves it from the hostile environment of outer space. (c) It absorbs most of the cosmic rays from outer space and a major portion of the electromagnetic radiation from the sun. (d) It transmits only here ultraviolet, visible, near infrared radiation (300 to 2500 nm) and radio waves. (0.14 to 40 m) while filtering out tissue-damaging ultra violate waves below about 300 nm. **Hydrosphere**: The Hydrosphere comprises all types of water resources oceans, seas, lakes, rivers, streams, reservoir, polar icecaps, glaciers, and ground water. (i) Nature 97% of the earth's water supply is in the oceans, (ii) About 2% of the water resources is locked in the polar icecaps and glaciers. (iii)Only about 1% is available as fresh surface water-rivers, lakes streams, and ground water fit to be used for human consumption and other uses. **Lithosphere:** Lithosphere is the outer mantle of the solid earth. It consists of minerals occurring in the earth's crusts and the soil e.g. minerals, organic matter, air and water. **Biosphere:** Biosphere indicates the realm of living organisms and their interactions with environment, viz atmosphere, hydrosphere and lithosphere.	**Key Definitions/ Formulas:** **VARIOUS TYPES OF ENVIRONMENT :** **1. Natural (Physical Environment) :** The environment in its original form without the interference of human beings is known as natural environment. Natural environment includes all living and nonliving things occurring naturally on earth. It operates through self regulating mechanism called homeostasis i.e, any change in the natural ecosystem brought about by natural processes is counter balanced by changes in other components of environment. Natural environment often used as a synonym of habitat. Examples- Ecosystem and Biodiversity. [2] **2. Man made or Anthropogenic Environment (Built Environment) :** The environment changed or modified by the interference of human beings is called man made environment. Man is the most evolved creature on this earth. He is modifying the environment according to his requirements without bothering for its consequences. Industrialization, urbanization and population explosion are deteriorating the environment more and more [1] Examples- Infrastructure, Utilities, Institutions, housing, industries , parks, buildings, energy networks, transportations, etc [2]. **3. Social Environment :** Social Environment includes an individual's social, economic and political condition wherein he lives. The moral, cultural and emotional forces influence the life and nature of individual behaviour. (Customs, Traditions, ethics, Language, Culture, Professions, Living conditions etc). The social environment refers to the immediate physical and social settings in which people live and or in which something happens or develop. It includes the culture that the individual

	The atmosphere forms a protective shell over the earth. The lowest layer, the troposphere, the only part warm enough for us to survive in, is only 12 kilometres thick. The stratosphere is 50 kilometres thick and contains a layer of sulphates which is important for the formation of rain. It also contains a layer of ozone, which absorbs ultra-violet light known to cause cancer and without which, no life could exist on earth. The atmosphere is not uniformly warmed by the sun. This leads to air flows and variations in climate, temperature and rainfall in different parts of the earth. The lithosphere began as a hot ball of matter which formed the earth about 4.6 billion years ago. About 3.2 billion years ago, the earth cooled down considerably and a very special event took place - life began on our planet. The crust of the earth is 6 or 7 kilometres thick and lies under the continents. The Biosphere is the relatively thin layer on the earth in which life can exist. Within it the air, water, rocks and soil and the living creatures, form structural and functional ecological units, which together can be considered as one giant global living system, that of our Earth itself.	was educated or lives in, and the people and institutions with whom they interact [3]. **4. Psychological Environment:** Although physical and social environment are common to the individual in a specific situation. Yet every individual has his own psychological environment, in which he lives. Kurt Lewin has used the term 'life space' for explaining psychological environment. The Psychological environment enables us to understand the personality of an individual. Both the person and his goal form psychological environment [2; 4]. **STRUCTURE OF ENVIRONMENT :** Environment consists both physical and biological. It includes both living and non-living components. • **Physical Environment** – (i) **Solid** - The lithosphere (solid earth) – Mountain Environment (ii) **Liquid** - The hydrosphere (water component) - Glacier Environment (iii) **Gas** - The atmosphere - Plateau Environnent & Costal Environnent. • **Biological Environment –** (i) Plants (flora) (ii) Animals (fauna)
	Application of Concept/ Examples in real life: The concept is useful in understanding the environmental issues and the knowledge shall apply in our day to day life to safeguard the environment.	**Link to YouTube/ OER/ video:** https://youtu.be/7G9eXI_DPn8 **Study of Environment**
Key Take away from this UO: Understanding the environment its types and elements.		

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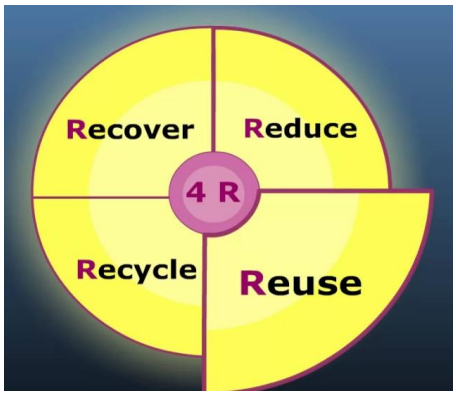
<Program Code:< **CE**>: <Course Code:**22447**>: <Course Name: **Environmental Studies**>: < **Unit-1:Environment**>: <**UO: 1d**>: <**Study Material**>

<**Dr. B. R. Ambade**>	<**03 July 2020**>	<**Dr. D. K. Parbat**>
Key words: Reduce, Reuse, Recycle, Recover	**Learning Objective:** To describe the need of public awareness about environment.	**Diagram/ Picture**
Key Questions: **Describe 4Rs.**	**Concept Map:** **CONCEPT Of 4Rs**  	
Solved word Problem: Answers of above questions are covered in study material.	**Explanation of Concept**: **Public awareness about environment** ► Educate the people about environmental studies. ► Participation of people in environmental issues. ► Implementation of principle of 4Rs. ► Adoption of eco-friendly technology. ► Conserve the resources. ► Follow various acts on environment. ► Practice and promote good civic sense and hygiene. ► Practice and promote to Reduce pollution. ► Join local movements that support activities like saving trees in your area, go on nature treks, recycle waste, buy environmentally friendly products. ► Join a group to study nature, such as WWF-1 or another environmental group	**Key Definitions/ Formulas:** **CONCEPT Of 4Rs** ► **Reduce:** Prevent generation of waste in the first place; by eliminating waste at source through better planning and design. Don't use a resource if there is an alternative. (Donate old things; Take good care of your things; choose walking / cycling than driving; Use glassware than paper wares). ► **Reuse:** Use a resource again and again without changing it or reprocessing it for different functions than what they are intended. (Old news papers used for packing; Plastic and steel containers used for plantation etc). ► **Recycle:** Reproduce / remanufacture the new material by using recyclable waste as raw material in its parent industry. (Paper, Glass, Plastic, Metal, Rubber etc). ► **Recover**: Producing usable products or energy by processing / treating the waste. (biogas, fertilizer, Waste to energy etc). ► **Benefits of 4R's – Reduce waste, Reduce pollution, Save energy, Save resources, Improve economy, Create employment.**
	Application of Concept/ Examples in real life: The concept is useful in understanding the concept of 4Rs and public awareness, the knowledge shall apply in our day to day life to safeguard the environment and conserve resources.	**Link to YouTube/ OER/ video:** **https://youtu.be/7G9eXI_DPn8** **Study of Environment**

References

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- ***Jorge Morales Pedraza, 2013.* WORLD MAJOR NUCLEAR ACCIDENTS AND THEIR NEGATIVE IMPACTIN THE ENVIRONMENT, HUMAN HEALTH AND PUBLIC OPINION, IJEEE , Volume 21, Number 2 , pp 1-24.**
- https://iasmania.com/greenhouse-effect-greenhouse-gases/
- **www. Britanica.com**
- **www. Onlinesciencenote.com**

Key Take away from this UO:

Understanding the environment issues and applies this knowledge during disasters, pandemic and epidemic situations. Also use this knowledge to safeguard the environment.

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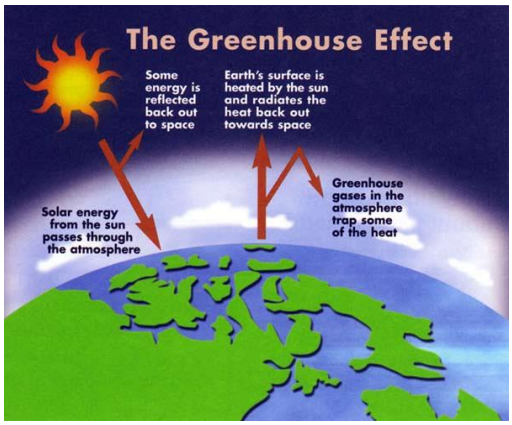
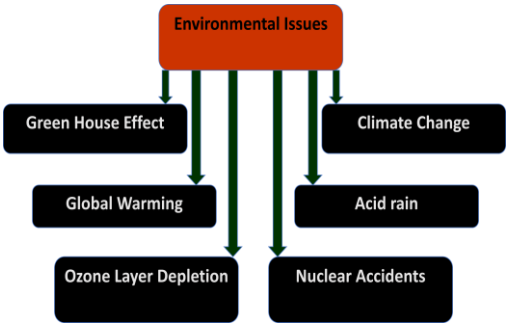
<**Dr. B. R. Ambade**>	<**03 July 2020**>	<**Dr. D. K. Parbat**>
Key words: Climate change, Green house effect, Global warming, Acid rain.	**Learning Objective:** To understand and describe various environmental issues.	**Diagram/ Picture** 
Key Questions: **Describe various environmental issues.**	**Concept Map:** 	
Solved word Problem: Answers of above questions are covered in study material.	**Explanation of Concept**: **GREEN HOUSE EFFECT:** A warming of Earth's surface and troposphere (the lowest layer of the atmosphere) caused by the presence of water vapour, carbon dioxide, methane, and certain other gases in the air. Of those gases, known as greenhouse gases, water vapour has the largest effect. **Effects on animals:** It helps spread different types of diseases like malaria, filariasis, cholera, and diarrhea etc due to rise in temperature. It helps increase the number of vectors like insects transmitting diseases. **Effects on plants:** It affects water cycle, soil moisture and soil composition. As a result, there is a change in cultivation and harvesting periods of crops. Due to the effect of global warming, tropical plants are seen at the temperate region. It also affects breeding, growth and development of disease causing insects. **Effects on climate:** It increases the temperature of earth. It brings about the melting of ice in the Polar Regions, which increases the sea level due to which the low land coastal areas may sink and go underwater. It also changes the pattern of rainfall and weather conditions. **GLOBAL WARMING** is the warming of the earth through carbon dioxide (CO2) being pumped into the atmosphere from tailpipes and smokestacks.	**Key Definitions/ Formulas:** The phenomenon of increasing the temperature of the earth as in artificial greenhouse gases is called *green house effect*. The gases which are responsible for the greenhouse effect are called ***greenhouse gases***.. Environmental scientists estimated that the green house effect of carbon dioxide was 57%, chlorofluorocarbon was 25%, methane was 12% and that of the oxides of nitrogen was 6%. **Global Warming Potential of Primary Greenhouse Gases** Greenhouse Gas | Chemical formula | Global Warming Potential [Time Horizon] 20 years | 100 years Carbon Dioxide CO_2 1 1 Methane CH_4 42-70 16-26 Nitrous Oxide N_2O 280 310 Hydrofluorocarbons HFCs 460 - 9,100 140-11,700 Perfluorocarbon PFCs 4,400-6,200 6,500-23,900 Sulphur Hexafluoride SF_6 16,300 23,900 • GWP is the global warming impact that a GHG would have over a 10-year timeframe • By definition, CO2 is used as the reference benchmark. **What changes climate?** • **Changes in:** – **Sun's output** – **Earth's orbit** – **Drifting continents** – **Volcanic eruptions**

Then the gases trap heat like the glass in a greenhouse. This is where the term the "greenhouse effect" came from.

Effects :

- Temperature increases
- Glaciers melt
- Rising ocean levels.
- Alter forests, crop yields.
- Affect human health.
- Affect ecosystems.
- Season changes.

CLIMATE CHANGE

- Climate is the average weather at a given point and time of year, over a long period (typically 30 years).
- We expect the weather to change a lot from day to day, but we expect the climate to remain relatively constant.
- If the climate doesn't remain constant, we call it climate change.

ACID RAIN

Acid rain is basically rain that has a low pH.

- When fossil fuels such as coal, oil and natural gas are burned, chemicals like sulfur dioxide and nitrogen oxides are produced.
- These chemicals react with water and other chemicals in the air to form sulfuric acid, nitric acid and other harmful pollutants like sulfates and nitrates. These acid pollutants spread upwards into the atmosphere, and finally return to the ground in the form of acid rain.

Effects of acid rain

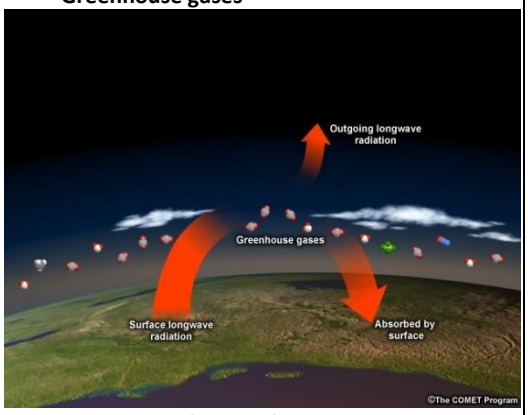
Acid rain is an extremely destructive form of pollution, and the environment suffers from its effects. Buildings, Forests, trees, lakes, aquatic life, animals, and plants suffer from acid rain.

DEPLETION OF OZONE LAYER

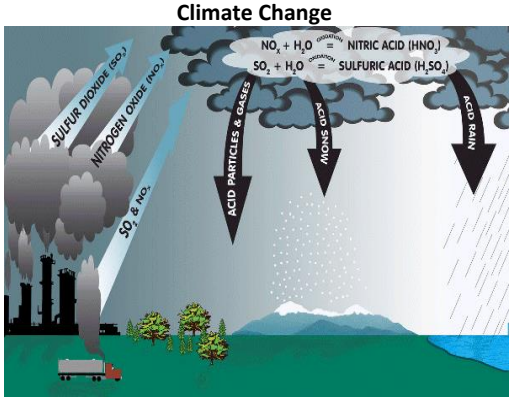
- Troposphere:
  - The lowest layer (about 15 km from the ground)
  - Contains normal air composed of N_2, O_2, water vapour, CO_2, etc.
  - Temperature decreases with altitude.
- Stratosphere:
  - Above the troposphere
  - Temperature increases with altitude
  - Contains a lot of ozone (ozone layer):
    - Found in the stratosphere between 10 - 50km above the ground .
    - Protects us from the harmful effects of UV of certain wavelengths.
    - Decrease in ozone concentration → Increase in UV-B radiation reaching the earth surface.

Formation of ozone layer

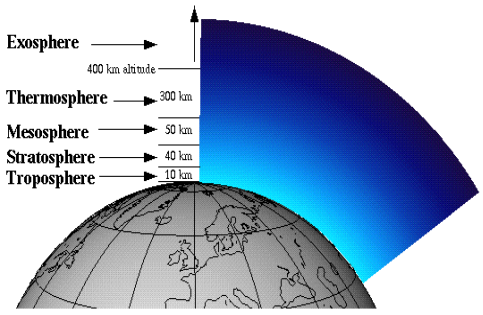
– **Greenhouse gases**



Climate Change



Acid Rain



Layers in atmosphere

Destruction of ozone Layer:

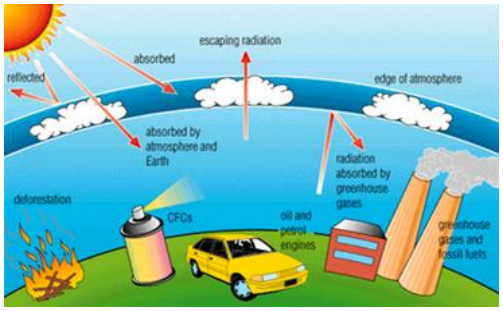
Chlorine atoms from CFCs attack the ozone, taking away ozone and forming chlorine monoxide (ClO).

$O_3 + Cl \rightarrow O_2 + ClO$

Chlorine monoxide then combines with another oxygen atom to form a new oxygen molecule and a chlorine atom.

$ClO + O \rightarrow Cl + O_2$

The chlorine atom is free to destroy up to 100,000 ozone molecules.



	O_2 + sunlight → O + O **O + O_2 → O_3** **Impacts of ozone layer depletion** • Sunburn, eye diseases (cataract), • Reduce our immune system • Skin Cancer • Cataracts and Other Eye Damages • Suppression of Immunity • Reduce photosynthesis - crops affected. • Reduce crop yield. • Reduces plankton population • Reduces penguin population • Reduces the percentage of hatching of frog eggs • Forming photochemical smog • Degrades building materials **NUCLEAR ACCIDENTS** When safety measures and principles are ignored or are not properly observed by nuclear plant operators, a nuclear accident can occurred with serious consequences for the environment, human health and public opinion. **Impacts of Nuclear Accidents** ► develop cancer ► deaths ► Species extinction ► DNA alter ► Residual radioactivity in environment (environmental pollution) ► High fever, diarrhoea, fatigue, mortality, infection bleeding etc. ► Skin diseases ► Disturb aquatic life	**Depletion of Ozone Layer** **Since 1959, ten major nuclear accidents have been reported by five countries. These nuclear accidents are the following:** • Fukushima, Japan - March 2011; • Kashiwazaki, Japan - July 2007; • Mihama, Japan - August 2004; • Blayais, France - December 1999; • Tokaimura, Japan - September 1999; • Tokaimura, Japan - March 1997; • Chernobyl, Ukraine - April 1986; • Three Mile Island, USA - March 1979; • The Urals, USSR - October 1958; • Windscale, UK – October 1957.  **Nuclear plant**
	Application of Concept/ Examples in real life: The concept is useful in understanding the environmental issues and the knowledge shall apply in our day to day life to safeguard the environment.	**Link to YouTube/ OER/ video:** https://youtu.be/7G9eXI_DPn8 **Study of Environment**
Key Take away from this UO: Understanding the environment issues and applies this knowledge during disasters, pandemic and epidemic situations. Also use this knowledge to safeguard the environment.		