

Subject Code = DCH004A

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EVS

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Unit = 1) Env't. and its multidisciplinary nature.

Unit = 2) Natural source = Renewable & Nonrenewable sources

Unit = 3) Ecosystem & Biodiversity

Unit = 4) Env't. Pollution

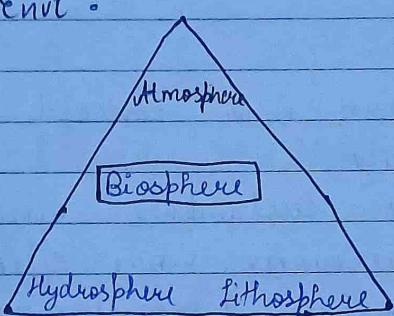
Solid waste management system.

Unit = 5) Social issues & Env't.

Envt. & its Multidimensional Nature

- Everything that surrounds and affects living organisms is Environment.
- The sum total of water, air and land & the interrelationship that exists among them & with human beings, other living organisms & materials.

Components of Envt. :



- # Biosphere = The part of the earth containing living organisms.
- It extends to about 22.5 km in thickness from ocean bottom to mountain top
 - But all the parts of biosphere is not suitable for life because
 - low temp.,
 - less concn of oxygen,
 - too high cosmic radiations.

Subdivision of Biosphere :

(i) Hydrosphere - It covers $\frac{3}{4}$ part of earth surface
It includes all liquid components - sea, oceans, lake etc.

(ii) Lithosphere = It compromises all solid particles or rocky substances.

It consists of main layers : crust, mantle, core.

(iii) Atmosphere =

Name of layer	distance	Example
1) Exosphere	700 - 10,000 km	Satellites
2) Thermosphere	80 - 700 km	Space crafts
3) Mesosphere	50 - 80 km	Meteors
4) Stratosphere	12 - 50 km	Radio sounds
5) Troposphere	0 - 12 km	Clouds

Importance of EVS =

- To clarify modern envr. concept like how to conserve biodiversity.
- To know the more sustainable way of living.
- To use natural resources more efficiently.
- To know the behaviour of organism under natural conditions
- To know the interrelationship b/w organisms in population and communities
- To aware and hesitate people regarding envt. issues and problems at local and international levels.

Scope of EVS :

Due to its complex & multi disciplinary nature, EVS as a subject has a wide scope.

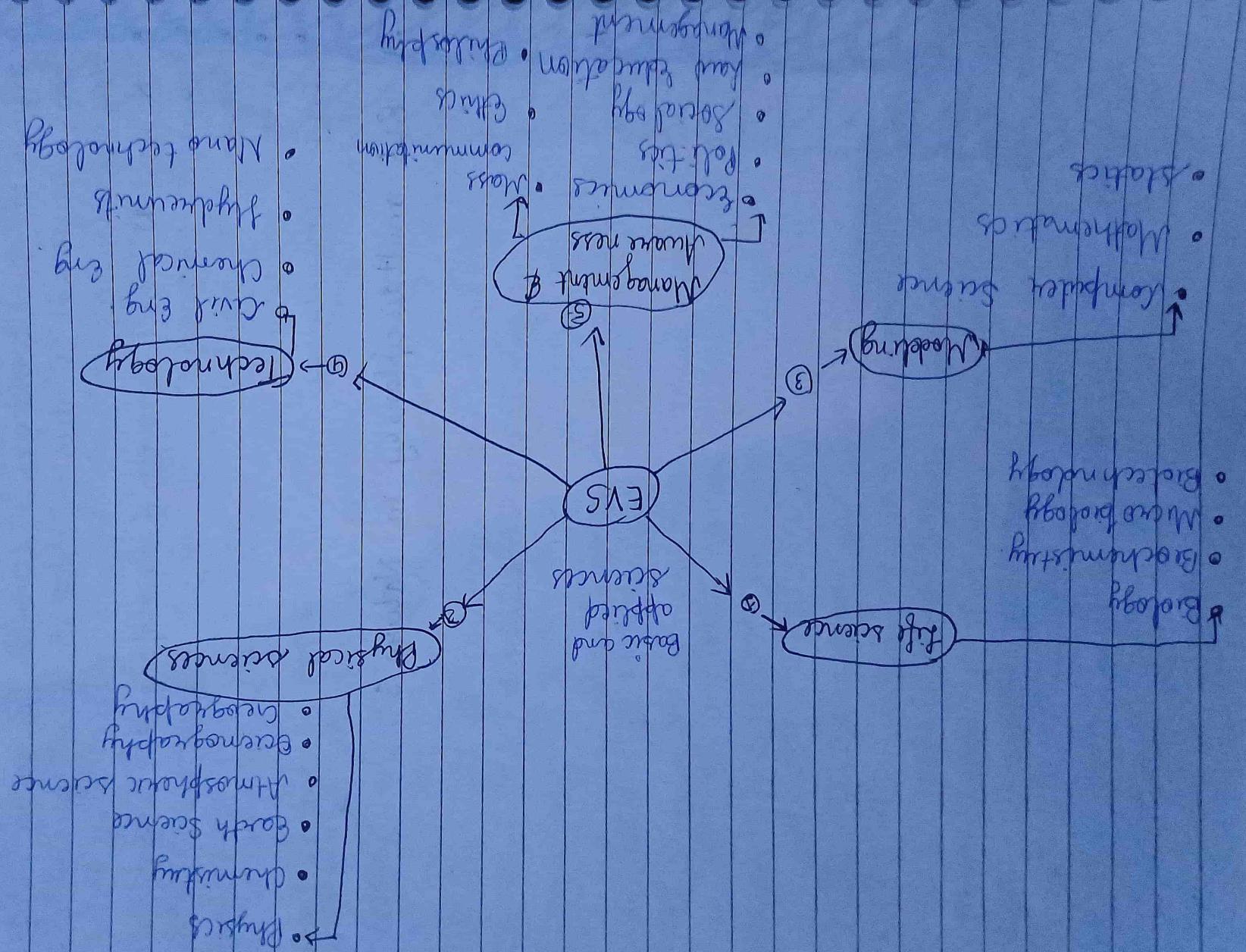
- Natural resources & their conservation, management
- Ecology and biodiversity
- Envir. pollution & control
- Social issue and its relation to development and envt.

- Human population and envt -

In the recent years, the scope of EVS has expanded to world over, several career options have emerged in this field that are broadly categorised as,

- R and D jobs (Research & development jobs)
- Green advocacy
- Green marketing
- Green media
- Env't consultancy

EVS multidisciplinary in Nature :



Renewable & Non Renewable Sources Energy

Energy Resources can be of two types:

(i) Renewable (Non Conventional Resources) (ii) Non Renewable (Conventional)

- * Resources which can be generated continuously in nature and are in exhaustable
- eg: wood, Solar energy, wind energy, tidal energy, hydro power, biomass biofuels, geothermal energy, hydrogen

* Can be used again & again in any endless manner

- * Cannot be reused or recycled.
- * There is no harm to the envt by using these sources
- * Huge harm done to the envt because of the harmful emissions.

Solar Energy : • Source of Solar Energy is Sun

- Nuclear fusion reactions occurring inside the Sun and release enormous quantity of energy in the form of heat and light.

- Solar Energy is received by the near Earth surface is approx. $1.4 \text{ kWatt} / \text{m}^2$
- Solar Constant

But now a days there are separate energy for several techniques for enhancing the solar energy.

- 1) Solar heat Collectors:
- 2) Solar Cells.
- 3) Solar Cooker
- 4) Solar water heater
- 5) Solar furnace
- 6) Solar Power Plant

1) Solar heat Collectors : Absorbs sun light to collect heat.

flat plate collectors are most common type of nonconcentrating collectors for water and space heating in buildings

Concentrating collectors , area intercepting solar radiation is greater , than the absorber area .

Ques 2) Solar Cells (PV Cells or Photovoltaic Cells)

- o These cells are made of thin wafers of semiconductors materials like $\text{C}_6\text{H}_5\text{Si}$, Si .
- o When solar radiation falls on them a potential diff is produced which causes flow of e^- and produce electricity.
- o Si can be obtained from Silica ~~are~~ sand which is available in abundant & in expensive.
- o By using $\text{C}_6\text{H}_5\text{Si}$, CdS or B , efficiency of PV cells can be improved.
- o The potential diff produced by a single PV cell of 1cm^2 size is about 0.4 to 0.5 volts and produces a current of 60 mA .

• A group of solar cells joint together in a definite pattern and form a solar panel which can produce a large amount of solar energy and can produce electricity to run street lights and irrigation water pumps.

Application of PV cells :

(i) Remote areas : PV cells can provide electricity to remote areas that don't have other sources such as cottage, parks

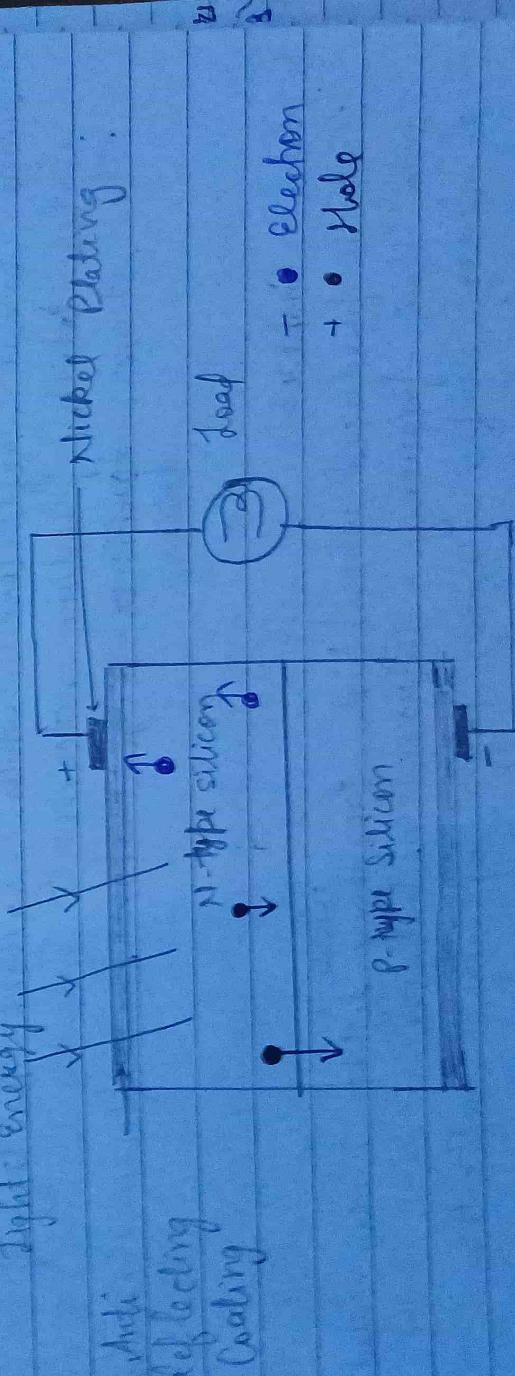
(ii) Agriculture : Irrigation system

(iii) Transportation : Temporary traffic signs and roadway lighting.

(iv) Space exploration.

Space experiments, exploration because they are light weight

(v) Solar farms that generates gigawatts of electricity



3) Solar water heater:

- It consists solar of an insulated box painted black from inside and having a glass lid. to receive and store solar heat.
- Inside the box it has black painted copper coil through which cold water is made to flow in which gas heated and flows out into the storage tank which is situated on the roof top is then supplied through the pipes into the buildings, hospital etc.

4) Solar furnace =

Here thousands of plane mirror arranged in concave reflector all of which collect solar heat and produce as high temp as 3000°C

5) Solar power plant =

Solar energy can be produced on large scale by using concave reflector which causes boiling of water which produce steam. The steam drives a generator to produce electricity.

6) Solar Cooker =

Plant is produced when high frequency light is converted into low frequency infrared radiation. of mirror surface with high specular reflection is used to concentrate and channelise light from sun into a small cooking space.

Wind Energy :-

Wind is used to produce electricity by converting the KE of air in motion into electricity.
Wind turbines, wind rotates the motor blades.
20 megawatt can be produced
but actually production is 1020 mega watt.

Hydropower = It is use of falling, fast running water to produce electricity ; or to power machines.
Achieved by converting the gravitational potential energy of a water source to produce power.

o Method of Sustainable Energy :

* Tidal Energy =

It is a renewable energy that uses a rise and fall of tides to generate electricity.
Water is denser than air , so tidal energy is more powerful than wind energy .

The gravitational forces of moon and sun, to a lesser extent , causes tides to originate in oceans.

High tides = Occurs when the highest part of a wave or crest reaches a coast line.

Low tides = Occurs when lowest part of a wave or trough , reaches the coastline .

* Ocean Thermal Energy: (OTEC)

- The Energy available due to the diff in temp. of water at the surface of the tropical ocean, and at deeper levels is called OTE.
- A diff of 20°C or more is required b/w surface water and off deeper water of ocean for operating the OTE powerplants
- The warm surface of ocean is used to boil a liquid like NH_3 (a low boiling fuel having a boiling point around -33°C at atm pressure)
- The high pressure vapours of this liquid form by boiling and then used to turbines generator and produce electricity.
- The cold water from deeper ocean is pumped to cool and condense the vapour into liquid thus process keeps in going for 24 hours in a day

* Geothermal Energy:

- Extracted from Earth's Crust .
- It combines energy from form's of planet and from radioactive decay .
- Best known natural displays are volcanoes, some acid fumaroles and geysers, hot springs .
- Its current uses include heating buildings, raising plants in greenhouse , drying crops , heating water at fish farms .

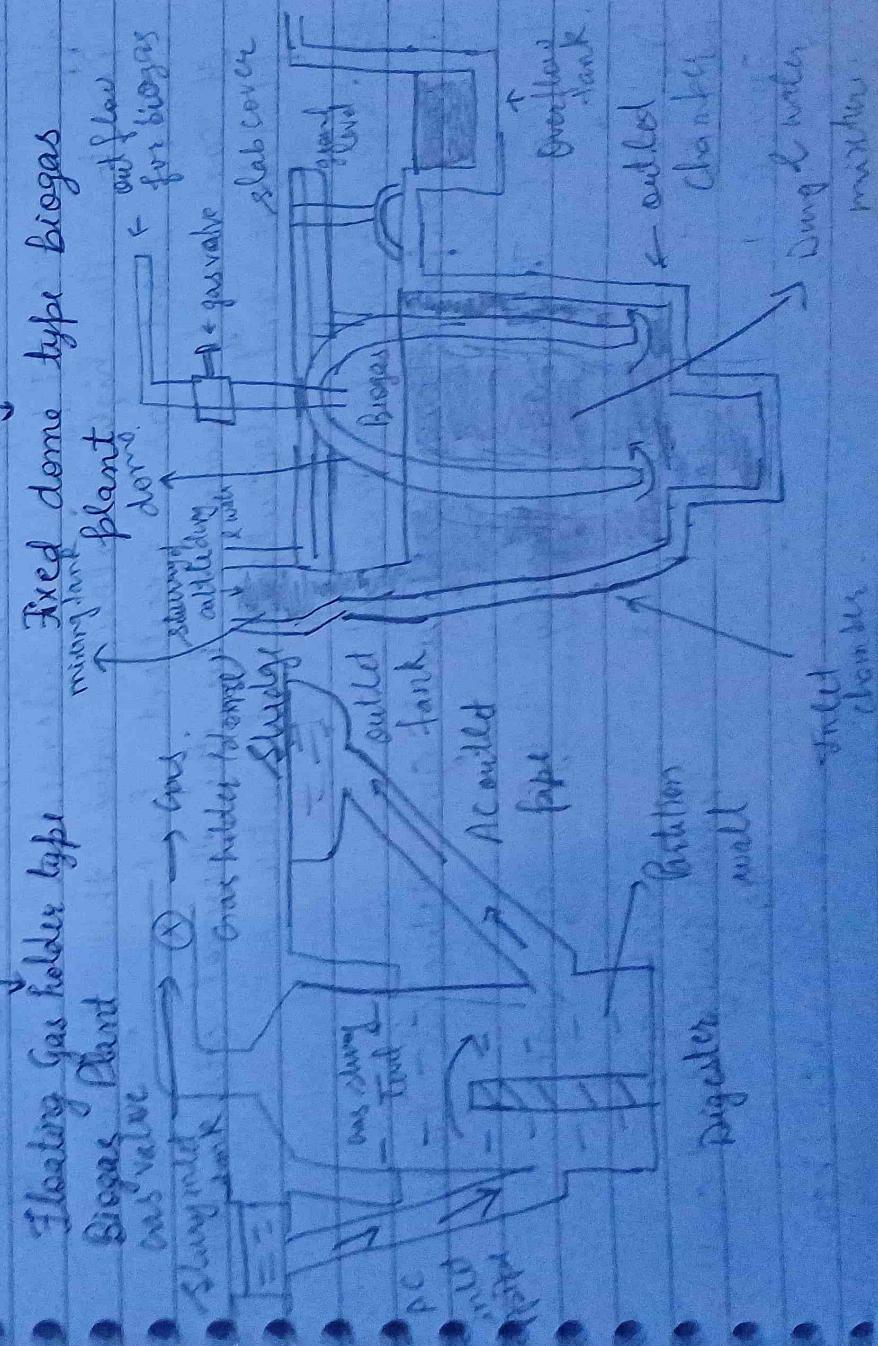
Biomass Energy: It is matter from living organisms which is used for bioenergy production

Organic crops, organic wastes from households
Climate impact of biodiversity production

Sigas: It is a mixture of methane, CO_2 , hydrogen

Bogas is produced by anaerobic degradation of animal waste sometimes plant waste in the presence of bacteria.

In India, two types of biogas plants are used



Biofuel =

Biomass can be fermented to alcohol like samples like methanol, ethanol and gasohol which can be used as fuels.

- Ethanol = easily produced from carbohydrate rich substances like Sugarcane, corn, sorghum. It burns clean and non pollutant.
- Gasohol = It is a mixture of ethanol and gasoline.
- Methanol = It is clean and non polluting fuel and obtained from woody plants.

Hydrogen as a fuel:

It is known as future of fuel. As hydrogen burns in air it combines with oxygen to water and large amount of energy after 150 kJ/gm is released. Due to its high calorific value this hydrogen can start as excellent fuel. It can easily produced by the thermal dissociation, photolysis and electrolysis of water.

Non Renewable Energy

- ① Coal, Oil, Petroleum
- ② Natural Gas
- ③ Nuclear fuels

1) Coal: There are mainly 3 types of coals

Lignite	Bituminous.	Anthracite
Brown Coal	Soft Coal	Highest Quality (hard coal)
70% C	80% C	90% C
		$c_v = 8700 \text{ kCal / Kg m}$

Peat - 60% Carbon

② Petroleum

It is lifeline of global economy. Crude petroleum is mixture of alkaline hydro-carbon and it can be purified or refined by fraction distillation process in which different constituent are separate out at different temp. acc. to their boiling points.

LPG = Main component is Butane other than are propane and ethane. This gas is odourless but in domestic cylinders it gives pungent smell; by the presence of ethyl mercaptan which is a false smell added to LPG so that any leakage from lpg cylinder can be detected easily.

③ Natural Gas:

Main component is 95% methane and small amount of propane and ethane. It is cleanest form of fossil fuel. Its calorific value is high i.e. 50 KJ/gm and burns without smoke.

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CNG (Compressed)
• Alternative of diesel, petrol
• Mixture of CO + H
SNG (Synthetic)

① Nuclear Energy

Nuclear fission

- It is a chain reaction indicated by one neutron that strikes a nucleus - bombarding a nucleus - releasing a huge quantity of energy + 2 smaller nuclei of Ba + Kr + 3 neutrons
- This reaction occurs between two nuclei, they will fuse together, which take place at very high temp of 1 billion °C - releasing 1 neutron + 1 fusion nucleus of ^3He with a huge amount of energy.

Natural Resources :

Unit = 3 Ecosystem

Ecosystem -

This term was introduced firstly by Sir Arthur Tansley in 1895.
This term means interrelationship of living organisms with environment.

Types of ecosystem]

Natural Ecosystem



Aquatic

→ Desert Fresh Marine Water River



Lentic Lotic (Running water)
(Standing water)

Components of ecosystem =

① Abiotic

Climate Edaphic (Study of Soil)
→ light → pH of soil
→ wind → minerals
→ temp → topography



② Biotic

Producers (Autotroph)
→ Herbivores
→ Carnivores
→ Omnivores
→ Photoautotrophs
→ Detritus
→ Chemoautotrophs

↓
Natural Scenarios

Journal of Education

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