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# "GENERAL SCIENCE AND ABILITY"

## PART - II SECTION - I

Q. NO. 8-

(a) **LIPIDS :-**

Lipids are a diverse group of hydrophobic or amphipathic organic molecules that are insoluble in water but soluble in organic solvents. They are essential components of biological systems and serve various structural, energy storage, and signaling roles.

### MAJOR TYPES OF LIPIDS :-

① **FATS (TRIGLYCERIDES) :-**

- composed of glycerol and three fatty acids.
- Function: long-term energy storage, insulation, and cushioning of organs.

② **GLYCOLIPIDS :-**

- Lipids with a carbohydrate group attached.



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- Functions: plays a role in cell recognition and signaling, particularly in the nervous system.

### ③ LIPOPROTEINS :-

- Complexes of lipids and proteins.
- Functions: Transport lipids through the bloodstream.

## FUNCTIONS OF LIPIDS :-

- **ENERGY STORAGE :-** Lipids store more energy per gram than carbohydrates or proteins.
- **STRUCTURAL ROLE :-** Key compounds of cellular membranes, providing fluidity and integrity.
- **WATERPROOFING :-** waxes and oils prevent water loss in plants and animals.



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(b)

## MEASURES FOR ENERGY CONSERVATION AND SUSTAINABLE USE :-

### ① Promoting Energy Efficiency :-

- use energy-efficient appliances (e.g., led bulbs, Energy star-rated devices).
- Regular maintenance of equipment to ensure optimal performance.

### ② Adopting Renewable Energy Sources :-

- Invest in solar, wind, hydro-power, and geothermal energy systems.

### ③ Reducing Fossil Fuel Dependence :-

- promote public transportation, carpooling, and biking to reduce emissions.



### ④ Behavioral Changes :-

- Turn OFF lights, appliances, and electronics when not in use.

### ⑤ Efficient water use :-

- Reduce water wastage as energy is required for pumping and treating water.

By implementing these measures, individuals, communities, and government can contribute to reducing energy consumption and ensuring its sustainable use -



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(C)

## HYDROGEN BONDING :-

Hydrogen bonding is a type of intermolecular force that occurs when a hydrogen atom, covalently bonded to a highly electronegative atom (such as nitrogen, oxygen, or fluorine), interacts with a lone pair of electrons on another electronegative atom.

## KEY CHARACTERISTICS :-

① **Electronegativity :-** The atom bonded to hydrogen must have a high electronegativity (e.g., N, O, F).

② **Directionality :-** Hydrogen bonds are directional, which makes them stronger than other van der Waals forces.



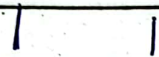
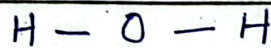
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## EXAMPLES WITH STRUCTURES :-

### ① Water ( $H_2O$ )

- Each water molecules can form up to four hydrogen bonds: two via its hydrogen atoms and two via lone pairs on oxygen.

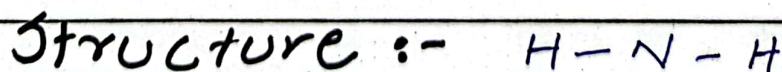
#### Structure :-



(Hydrogen bonds indicated by  $\cdots$  between the oxygen of one molecules and the hydrogen of another).

### ② Ammonia ( $NH_3$ )

- Ammonia molecules form hydrogen bonds between the hydrogen atoms of one molecules and the lone pair on the nitrogen of another.





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(a)

## THE NERVOUS SYSTEM OF THE HUMAN BODY :-

The nervous system is a complex network that coordinates the body's activities by transmitting signals between different parts. It enables the body to sense, respond to, and regulate internal and external stimuli.

### COMPONENTS OF THE NERVOUS SYSTEM :-

#### ① Central Nervous System (CNS) :-

- Function: Acts as the control center, processing and interpreting sensory information and generating responses.

#### • Key parts :-

- Brain: Control thoughts, emotions, memory, motor skills, and sensory processing.



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- Spinal Cord :-
- Connects the brain to the body and facilitates the transmission of signals.

## (2) Peripheral Nervous System (PNS) :-

- Function: connects the CNS to the rest of the body.
- Key Divisions.

### • Somatic Nervous System :-

- Controls voluntary movements of skeletal muscles.

### • Autonomic Nervous System (ANS) :-

- Regulates involuntary functions like heart rate, digestion, and respiration.

## (3) Enteric Nervous System (ENS) :-

- Functions: Often considered a part of the autonomic system, it governs the gastrointestinal tract's functions independently of the CNS.



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(a) Eukaryotic and prokaryotic cells differ in several key aspects:

## ① NUCLEUS :-

### • Eukaryotic Cells :-

These cells have a defined nucleus that houses their genetic material.

### • Prokaryotic Cells :-

They lack a true nucleus, instead, their genetic material is located in the nucleoid region.

## ② Size :-

### • Eukaryotic Cells :-

Generally larger, typically ranging from 10 to 100 micrometers.

### • Prokaryotic Cells :-

Smaller in size, usually about 0.1 to 5 micrometers.



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### ③ REPRODUCTION :-

#### • EUKARYOTIC CELLS :-

Typically reproduce sexually or asexually through mitosis and meiosis.

#### • PROKARYOTIC CELLS :-

Reproduce asexually through binary fission

### ④ EXAMPLES :-

#### • EUKARYOTIC CELLS :-

Examples include plant cells, animal cells, and fungal cells.

#### • PROKARYOTIC CELLS :-

Examples includes bacteria and archaea.



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(b)

## GLOBAL WARMING :-

Global warming refers to the long-term rise in Earth's average surface temperature due to human activities, primarily the emission of greenhouse gases such as carbon dioxide ( $\text{CO}_2$ ), methane ( $\text{CH}_4$ ) and nitrous oxide ( $\text{N}_2\text{O}$ ). These gases trap heat in the Earth's atmosphere, leading to a "greenhouse effect." Key contributors to global warming include:

- ① Burning fossil fuels (coal, oil and natural gas) for energy and transportation.
- ② Deforestation, which reduces the number of trees that absorb  $\text{CO}_2$ .
- ③ Industrial processes and waste management, which emit various greenhouse gases.



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## KYOTO PROTOCOL :-

The Kyoto protocol is an international treaty adopted in 1997 under the United Nations Framework Convention on climate change (UNFCCC). It aims to combat global warming by reducing greenhouse gas emissions.

## KEY FEATURES OF THE KYOTO PROTOCOL :-

① **Blind Targets :-** Developed countries agreed to reduce their greenhouse gas emissions by an average of 5.2% below 1990 levels during the first commitment period (2008-2012).

② **Flexibility Mechanism :-** Countries could meet their targets through:

- **Emission trading :-** Buying or selling emission allowances.
- **Clean Development Mechanism (CDM) :-**

Investing in emission-reduction projects in developing countries.