Section - I

Question - 2

(a)

(i) ## Lipids:

Lipids are a diverse group of hydrophobic or amphipathic biomolecule that are primarily composed of carbon, hydrogen, and oxygen. They are insoluble in water, but soluble in nonpolar solvents, such as alcohols and ethers. Lipids plays critical role in biological functions/ systems, serving as energy storage molecule, structural components of cell membrane, and signalling molecules.

(ii) ## Major types of lipids

1. ## Saturated fat:

Saturated fat is solid at room temperature, therefore it is also known as "solid fat". It is mostly present in animals foods, such as milk, chese, and meat.

Tregly cericle is example of saturated fats.

2. Trans fats:

Fat containing trans isomer fatty acids, formed by partcally hydrogenating unsaturated fats. This process make fats harder and increase their shelf life.

Cookies, vegetables oils, snacks and chips are the examples.

3. Unsaturated fats:

These fats are liquid at room temperature. It is mostly present on plant oils and consumption of it can increase or improve cholestrol level

(iii) Functions of Lipids.

- Protection of vital organs: They protect vital organs like heart and kidneys.
- Mainknance of body temperature: Body temperature is maintained by brown fats.
- Energy storage: lips store more energy per gram than corbohydrates.
- Skuctural roles: Phosolipids and cholestrol are important to maintain integrity, and fluidly of cell membrane.

- Insulation and Protection: Triglycerides help regulate body temperature and protect internal organs

- Signalling: Lipids help in cellular Communication and regulation

- Saturated lipids:

$$O=C-C-C-C-C-C-C-C-C-C-H$$

with H atoms attached and $HO-$ group

- Unsaturated lipids:

$$O=C-C-C-C-C-C=C$$

with H atoms attached

(b)

Energy can be conversed and sustainably used by following ways.

1. Reduction of Energy consumption in daily life:
   When the electricity appliances are not in use they should be turned off. And energy efficient appliances like LED bulbs should be used.

2. Promotion of renewable energy sources:
   Consumers should invest in solar panels, wind energy or geothermal methods for residential or industrial use.

3. Improve energy efficiency:
   Energy efficiency designs of buildings should be constructed like proper insulation and double glazed windows. Moreover, to reduce energy waste regular maintenance of machinery and vehicles should be done. Smart grids and energy storage solutions for efficient energy distribution can also help.

4. Opting sustainable transportation: people should should use public transportation and opt cycling and should shift to electric or hybrid vehicle.

5. Educate and raise awarness: Community compaigns should be conducted about energy conversion and Sustainability. Moreover, energy related topics should be add in cursiculm.

6. Reduction of industrial energy waste: Minimum energy consuming processes should be used and energy waste in industries should be reused and recovered

7. Conversion of natural resources: Dependence on fossil fuels should be reduced and alternative energy sources should be adopted. Ecosystem and forests should be protected because they act as Carbon Sink

(c) Hydrogen bonding:

Hydrogen bonding is a type of weak intermolecular force that occurs when a hydrogen atom covalently bonded to a highly electronegative atom like oxygen nitrogen, or flourine interacts with another electronegative atom energy. The bond is not true chemical bond but a strong dipole-dipole attraction. Hydrogen bonding plays a vital role in determining the physical and chemical properties of substances, such as water and DNA.
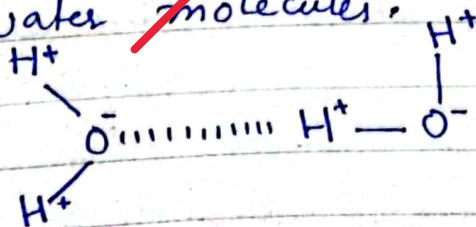
Examples with Structures:

1. Water (H_2O)

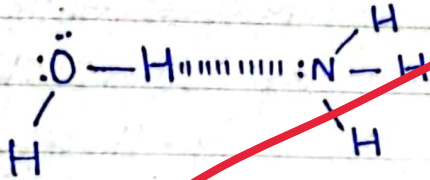Water molecule form hydrogen bonds due to the electronegativity of oxygen.

Structure:

oxygen has a lone pair that interact with hydrogen atoms of neighbouring water molecules.

$$H^+ \quad \overset{|}{O} \cdots\cdots\cdots H^+ - O^- \quad H^+$$

$$H^+$$

2. Ammonia (NH₃)

In Ammonia nitrogen's lone pair ~~attracts~~ interacts with hydrogen from another molecule.

$$:\ddot{O}-H\text{''''''''''}:N-H$$

with H below O on the left, and H at top and H at bottom on the right.

3. Hydrogen flouride (HF)

Hydrogen flouride forms strong hydrogen bonds because flourine is highly electronegative.

$$H-F\cdots H-F\cdots H$$

(d) Nervous System of the Human Body:

The nervous system is highly complex network of specialized cells responsible for transmitting signals between different parts of the body. It regulates and coordinates all body functions from voluntary movement to involuntary proces like breathing and heartbet.
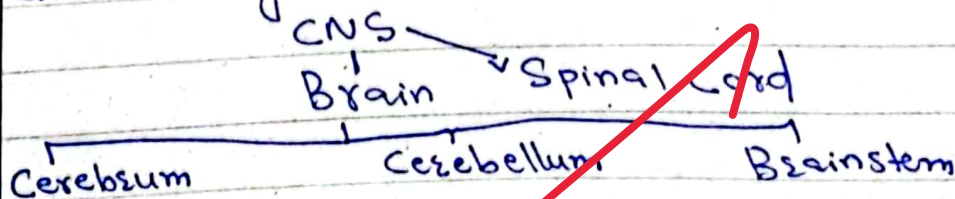
(i) Divisions of the nervous system:

1. CNS (Central Nervous System)

The CNS serves as the control center, processing and interpreting sensory information and initiating response is the core function of CNS

Components:

- Brain: Controls thoughts, emotions, memory and body functions.

```
        CNS
      /      \
   Brain    Spinal Cord
   /    \          \
Cerebrum  Cerebellum  Brainstem
```

- Spinal Cord: Connects the brain to the peripheral nervous system and relays information.

2. Peripheral Nervous System (P.NS)

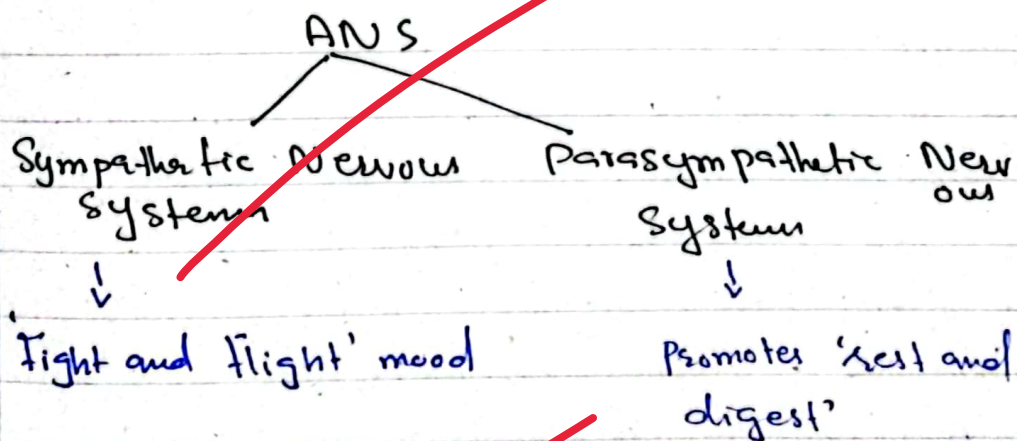The PNS connects the CNS to the rest of the body.

- Components:
- Somatic Nervous System (SNS)
It controls voluntary movement of skeletal muscles and relays sensory information from receptors to CNS.
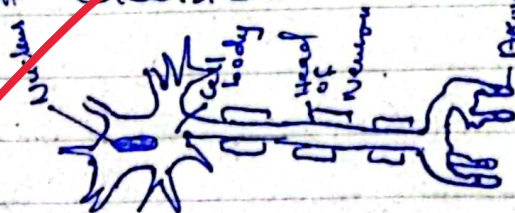
- Automatic Nervous System (ANS)
It regulates voluntary functions like heart rate, digestion, and respiration.

ANS

Sympathetic Nervous System   Parasympathetic Nervous System
         ↓   ↓
Fight and Flight' mood   Promotes 'rest and digest'

(ii) Neurons: The Building Blocks
These are specialized cells that transmit electrical and chemical signals.

(ii) **Functions of the Nervous System**

Collects information from sensory organs and sends to CNS.

Processes and interprets sensory input to decide on appropriate actions.

Sends signals to muscles or glands to elicit a response.

Maintains internal balance by regulating body functions like temperature and blood pressure.
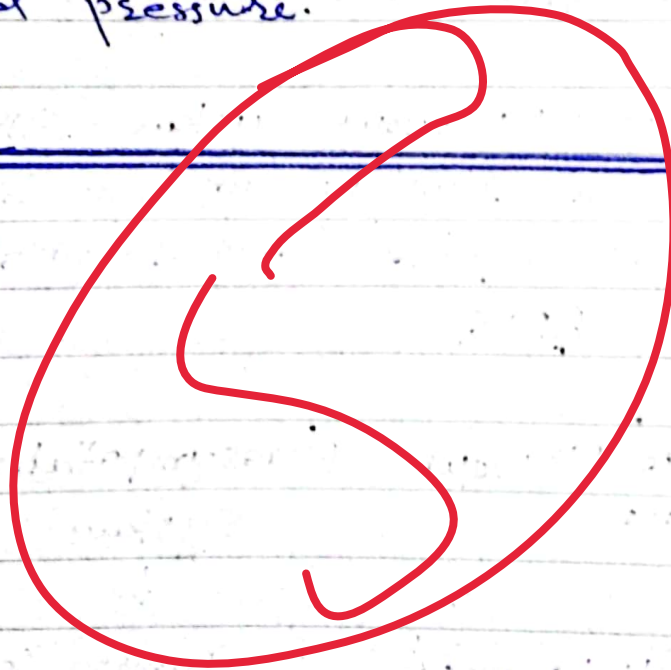
Question - 3:

(a)

The sun is a massive, ball of hot, glowing gasses primarily composed of hydrogen and helium its structure consists of several distinct layers, each with unique properties and function. These layers can be divided into interior and atmospheric layers.

i) Interior layers:

(1) Core:

It is the central region of the sun

Features:

- Nuclear fusion occurs here, where hydrogen is converted into helium, releasing vast amount of energy
- Temperature is 15 million c
- Energy is generated here in form of gamma rays

(2) Radiative Zone:

It is the portion that surrounds the core.

Features:

- Energy is transferred outward by radiation through tightly packed gas.
- Temperature decreases as distance from the Sun increases.

(3) Convective Zone:

The outermost layer of the Sun's interior region.

Features:

- Energy is transported by convection
- Visible boiling or granulation effects on the Sun's surface are caused by this process

(ii) Atmospheric layers:

(1) Photosphere:

It is the Sun's visible surface.

Features:

- Emits the visible light
- Temperature is 5500 C°
- Sunspots and granules are observed here

(2) Chromosphere:

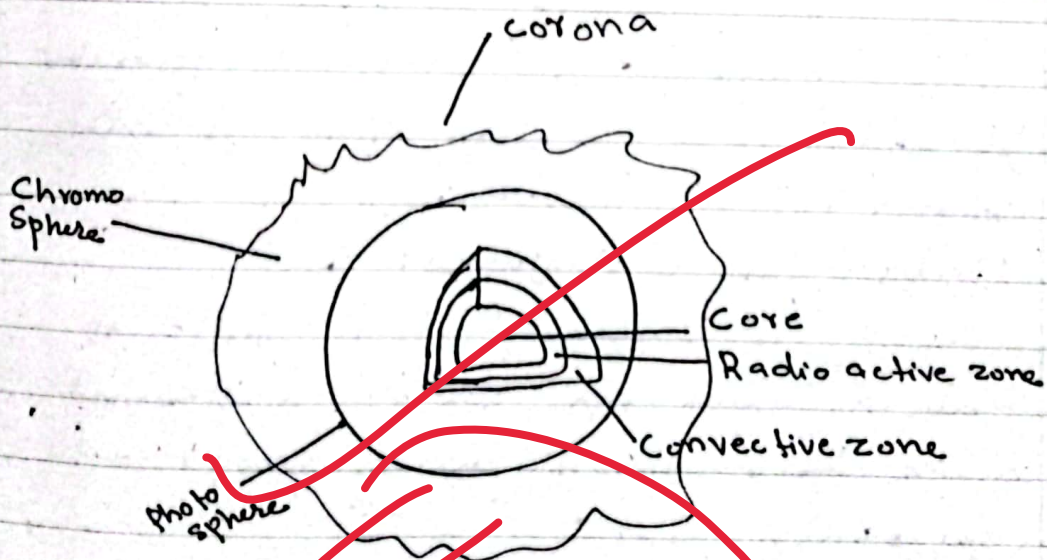This region is above the photosphere.

Features:
- Emits reddish glow during solar eclipse.
- Temperature here is 20,000 $\dot{c}$

(3) Corona:

It is the outermost layer of sun

Features:
- Extends millions of kilometers into the space
- Visible as halo during solar eclipse.
- Temperature: 1-3 million $\dot{c}$ much hotter than the surface due to magnetic heating.

Structure of Sun

(b)

Tsunami:

A tsunami is a series of large, powerful ocean waves caused by the sudden displacement of a significant volume of water. These waves can travel across entire ocean basins at high speed (up to 800 km/h) and cause widespread destruction upon reaching coastal areas. The term tsunami comes from Japanese, meaning "harbor wave."

How is Tsunami Generated?

Tsunamis are typically generated by events that disturb floor or water column. These include:

1) **Underwater Earthquakes:**

Sudden tectonic shifts at subduction zones create vertical displacement of the seafloor, pushing water upward and generating waves.

2) **Volcanic Eruptions:**

Underwater or near-coast eruptions can displace large amounts of water.

3) Landslides:

Landslides whether underwater or from coastal cliffs, can displace water and create tsunami

4) Meteorite Impacts:

Rare but potentially catastrophics as a large meteorite impact in an ocean would generate immense wave.

5) Glacial calving:

Large ice masses breaking off into the ocean can also create localized tsunamis.

Examples of Recent Tsunamis:

1) Sulawesi Tsunami, Indonesia (2018)

This tsunami was caused by underwater earthquake of magnitude 7.5 and affected Palu city of Indonesia severly, with over 4,000 fatalities

2) Tonga Volcanic Tsunami (2022)

The eruption of the Hunga-Tunga Volcano caused massive pressure waves and caused widespread destruction in Tonga.

(c)

Environmental Pollution:

Environmental pollution refers to the contamination of the natural environment by harmful substances or energy, adversly affecting ecosystem, human health and biodiversity. Pollution occurs when the environment cannot process or neutralize harmful byproducts of human activities effectivly.

Types of Environmental Pollution

| Air Pollution | Water Pollution | Soil Pollution | Noise pollution | Plastic Pollution |

Harmful Effects of Pollution:

1. On Human health:

Environmental pollution causes respiratory disease like asthma, waterbrne diseases like cholera, typhoids and neurological damage.

2. On Ecosystem:

Environmental pollution causes loss of biodiversity due to habitat destruction and toxic substances. Disruption of

food chains, as pollutants accumulate in organisms, occurs.

3. On climate :
Greenhouse gasses emissions contribute to global warming and climate change. Moreover, Acid rain harms forests, crops and aquatic life

4. On Soil fertility :
Contamination reduces agriculture productivity and desertification happened due to deforestation and soil erosion.

5. On oceans :
Marine life is endangered by oil spills, plastics and chemical runoff.

• Measures to curb Pollution.
• Transition to renewable energy sources
• Implementation of recycling programs and reduction of plastic use
• Promotion of compositing of organic waste
• Using eco friendly fertilizers and pesticides
• Practice of crop rotation and agroforestry

to preserve soil health
- Enforce laws to limit industrial emissions and deforestation
- Public awareness campaigns needed

(d)

Wireless Communication:

Wireless communication is the transfer of information between two or more devices without the use of wires. Instead, it relies on electromagnetic waves, such as radio waves, microwaves, or infrared, to transmit data over short or long distances.

Examples of wireless communication:
- Mobile phones
- Wi-fi networks
- Bluetooth devices
- Satellite communication
- Radio and television broadcasting

Working of a Satellite:

A satellite is an artificial object placed in orbit around the Earth or another celestial object to perform various functions such as

commuication, navigation, weather forecasting, and scientific Research. It operates by recieving and transmitting Signals from Earth Station.

- Key components of a Satellite
- Transponder: Recieves information, incoming signals, amplifies them and sends back to Easth

- Antenns: Sends and Recieves electromagnetic Signals

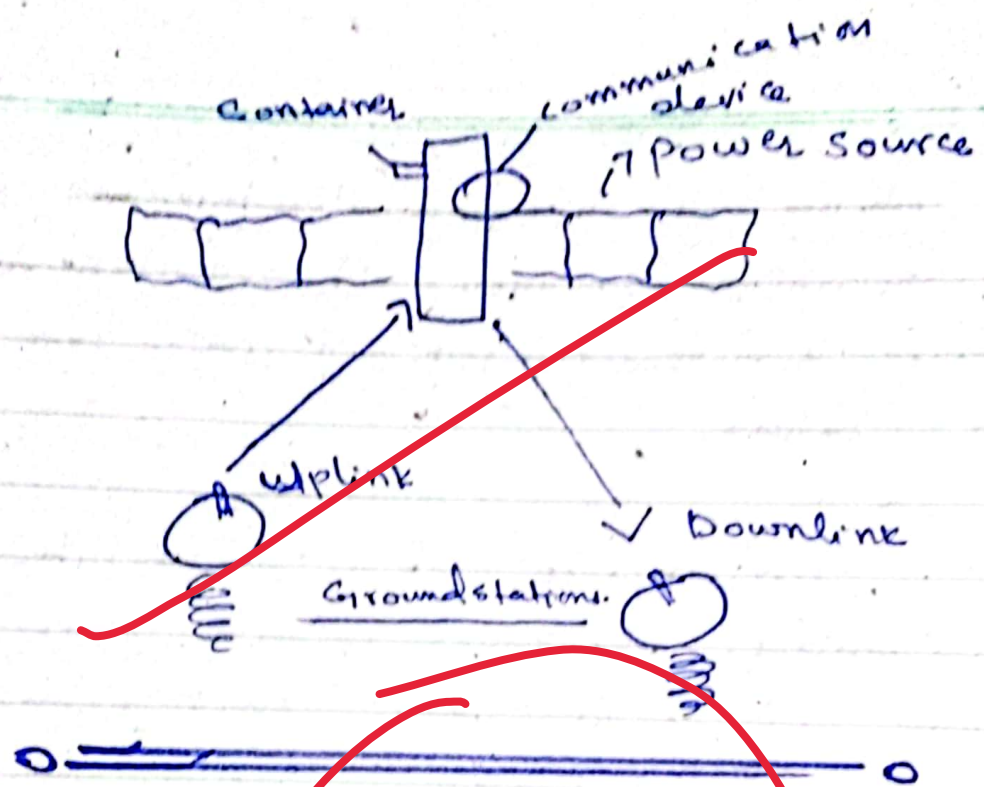- Solar panel: psovides energy for converting sunlight into electricity

- Control System: Stablize and orrent the Satellite in its orbit.

- Steps in Satellite Communication

1. Signal transmission from Earth Station
2. Signal processing by the Satellite
3. Digital downlink to earth

Container   communication
             device
                      Power Source

Uplink   Downlink

Ground station.

Section - II

Question - 6

(a)

Let the number be $1000a + 100b + c$

Condition 1: $a + b + c = 15$

condition 2: $b + c = 12$

condition 3: $c - b = 2$

from condition 3: $c = b + 2$

Substituting $c = b + 2$ into condition 2

$b + (b + 2) = 12 \implies 2b + 2 = 12$

$\implies 2b = 10$

$\implies b = 5 \quad, \quad c = 7$

Substitute $b = 5$ and $c = 7$ into condition 1

$a + 5 + 7 = 15 \implies a = 3$

then

$100a + 10b + c = 100(3) + 10(7) + 5$

$\implies \boxed{375}$ Answer-

(b)

As we know
18 people = 1 slice each
The ratio of Pizza slices in
small, medium, and large = 2:3:4
Each slice weighs = 40g
Price of Small pizza = 320

⇒ Let the number of Slices in the
small, medium, and large pizza be
$2x$, $3x$, $4x$ respectively
⇒ Total number of Slices = $2x + 3x + 4x = 9x$
Since there are 18 slices, $9x = 18$,
So $x = 2$
Thus:
Small pizza has $2x = 4$ slices
Medium pizza has $3x = 6$ slices
large pizza has $4x = 8$ slices

⇒ Now, calculating the total weight of
the pizzas

Total slices = 18 slices
Total weight = 18×40 gm = 720 gm

⇒ The price of each pizza ~~₹320~~
Small pizza = RS 320

price per slice of small pizza $= \dfrac{320}{4} = 80$ Rs

Total price $= 80 \times 18 = 1440$ Rs

Thus the total weight of the pizzas is 720 grams, and the total price is Rs 1440.

you can edify by presenting it in more fascinating way. such as diagrams, clearly labeling it. creating heading and sub headings and then explain it a little. following the standard method for maths portion with accurate calculations. and good use of marker can help you in earning good grades.

(c)

Data:

Diameter of the circle = 6 cm

The radius 'r' is the half of diameter

$$r = \frac{6}{2} = 3 \text{ cm}$$

Circumference $C = 2\pi r = 2\pi \times 3 = 6\pi \text{ cm}$

$\pi = 3.14$

$$C = 6 \times 3.14 = 18.84 \text{ cm}$$

Area $= \pi r^2 = 3.14 \times 3^2 = 3.14 \times 9 = 28.26 \text{ cm}^2$

Thus the circumference is 18.84 cm, and the area is 28.26 cm².

(d)

(i) 13, 24, 46, 90, 178

The pattern follows

24 - 13 = 11

46 - 24 = 22

90 - 46 = 44

170 - 90 = 88

The differences double each time, so the next difference will be 176.

Thus the next number 178 + 176 = $\underline{354}$

(ii) 5, 6, 9, 14, 21

The pattern follows

6 - 5 = 1

9 - 6 = 3

14 - 9 = 5

21 - 4 = 7

The difference is increasing by 2. So the next difference will be

7 + 2 = 9

$$21 + 9 = \boxed{30}$$

Question - 7:

(a)

(i)

IQ (Intelligence Quotient)

It is a measure of person's intellectual abilities or cognitive intelligence. It is typically assessed through standardized tests designed to measure logical reasoning, problem solving, mathematical ability, language skills, and memory. A high IQ typically indicates strong analytical and logical thinking skills.

(ii)

EQ (Emotional Quotient)

It refers to ability to recognize, understand and manage, and influence one's own emotions and the emotions of the others. EQ involves skills, like empathy, self regulation, motivation, social skills, and emotional awareness.

(b)

Let Aman's present age be x

After 20 years Aman $= x+20$

Ten years ago Aman's age was $= x-10$

According to the problem, after 20 years Aman's age of will be 10 times his age 10 years ago

So, $x+20 = 10(x-10)$

Now, let's solve this equation

$x+20 = 10(x-10)$

Expanding this on right hand

$x+20 = 10x-100$

Now, moving all items involving x to one side and constants to the other side

$x-10x = 100-20$

$-9x = -120$

Solving for x

$x = \dfrac{-120}{-9} = \dfrac{120}{9} = 13.33$

So Aman's present age is 13 years and 4 months.

(c)

§To solve this problem we need to find how long it will take for peter and john to move the lawn together, given their individual moving rates.

Step 1: Finding their individual rate peter can move law in 40 minutes.
=> His rate is :
Peter's rate = $\frac{1}{40}$ (lawn per minute)

=> John can mow the lawn in 60 minutes, his rate is,
John's rate = $\frac{1}{60}$ (lawn per minute)

Step 2: Combining their rates

when they work together, their combined rate is the sum of their individual rates

Combined rate: $\frac{1}{40} + \frac{1}{60}$

Step 3: Finding the least common denominator
$\frac{1}{40} = \frac{3}{120}$, $\frac{1}{60} = \frac{2}{120}$

Step 4 : Adding the rates

Combined rate = $\dfrac{3}{120} + \dfrac{2}{120} = \dfrac{5}{120} = \dfrac{1}{24}$

Step 5 : Finding the time to mow the lawn together

Combined rate = $\dfrac{1}{24}$

Time = $\dfrac{1}{\frac{1}{24}}$ = 24 minutes

Thus, It will take 24 minutes for Peter and John to mow the lawn together.