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General Science and Ability

Part II
Section I

Question 2
Part a

Lipids

Lipids are diverse group of molecules that are primarily composed of carbon and hydrogen atoms. They are insoluble in water but solvent in nonpolar solvents. Lipids play an essential role in the body, including energy storage, protection of organs, and cell membrane structure.

Types of Lipids

i. **Triglycecides**:

These are the most common type of lipid, consisting of three fatty acid chain attached to a glycerol molecule.

ii **Phospholipids**:

These lipids have a hydrophilic head and a hydrophobic tail. They are the major components of cell membranes, forming a lipid bilayer that separates the cell from its environment.

iii **Steroids**:

These lipids have a unique

structure consisting of four fused carbon rings. Cholesterol is a well-known steroid that is a precursor to other steroids.

Functions of Lipids

i. **Energy Storage**: Triglycerides provide long-term energy reserve for the body
ii **Protection**: Lipids cushion and protect organs
iii **Vitamin Absorption**: Lipids aid in the absorption of fat-soluble vitamin A, D, E, and K
iv. **Insulation**: Lipids act as a thermal insulators, helping body to maintain temperature

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part b

Measures for energy conservation

i. Turning off lights and appliances not in use.
ii Using energy-efficient appliances.
iii Driving less and using public transport, bike or walking.
iv. Using natural lights.

Measures for sustainable energy use

i. Investing in renewable energy resources such as solar panels or wind turbines.

ii. Driving energy-efficient vehicles or electric vehicles

iii Advocating for policies that promote energy conservation and renewable energy

iv. Spreading awareness about importance of energy conservation and sustainable practices.

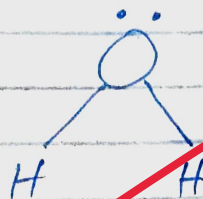
part c

Hydrogen Bonding

Hydrogen bonding is a dipole-dipole attraction that occurs between a hydrogen atom bonded to a highly negative atom such as nitrogen, oxygen, or fluorine, and another electronegative atom with a lone pair of electrons. This creates strong electrostatic attraction between partially positive hydrogen atom and a partially negative electronegative atom.

Examples of Hydrogen Bonding

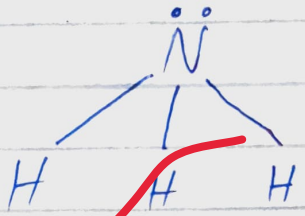
i. Water H_2O



Here two partially positive atoms of hydrogen

are attached to one negative electronegative atom Oxygen.

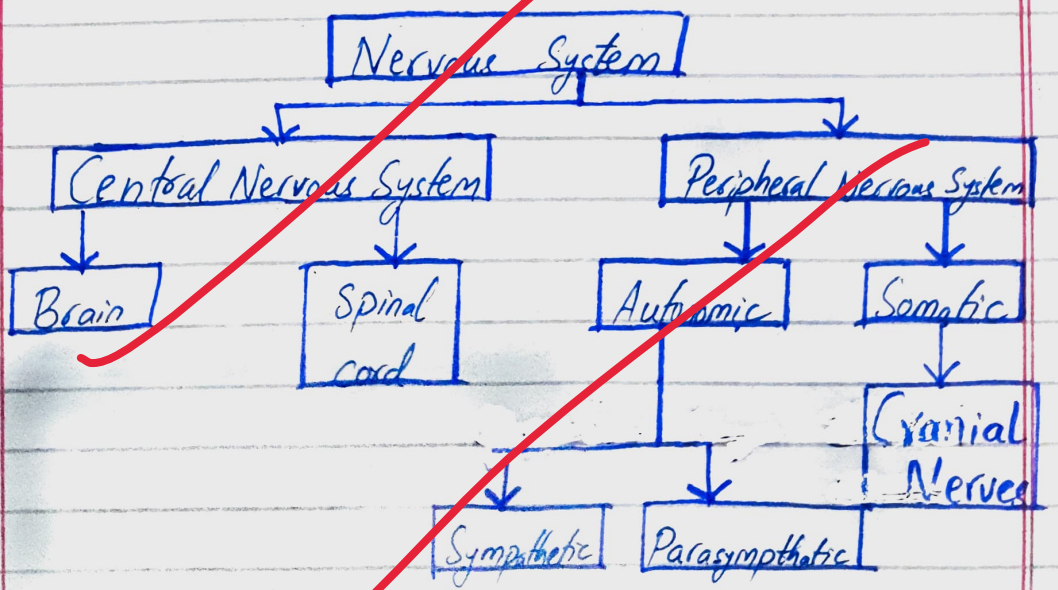
ii Ammonia NH_3



Here three partially positive hydrogen atoms are attached to one partially negative atom of Nitrogen

~~part d~~

Nervous System of Human Body



The nervous system of human beings is a complex network of cells and tissues that control every aspect of body's function

Structure of the Nervous System

The nervous system is divided into two main parts

i The Central Nervous System

Brain: This is the control center of human body responsible for all voluntary and involuntary actions

Spinal Cord: A long thin bundle of nervous tissues that extends from the brain and down towards the back

ii The Peripheral Nervous System

Somatic Nervous System: Controls voluntary muscle movements

Autonomic Nervous System: Controls involuntary functions like heart rate, digestion, and respiration.

Question 4
part a

Hepatitis:

Hepatitis is a general term used to describe liver inflammation. The liver is a vital organ responsible for various functions including filtering blood and producing bile. When it becomes inflamed, it can impair its ability to perform these functions.

Causes of Hepatitis:

i. Viral infections: Hepatitis A, B, C, D, and E are the most common types of viral infections

ii. Alcohol abuse: Excessive alcohol consumption can damage the liver and also causing future problems.

iii. Toxins: Exposure to such toxins especially those found in chemical industries can damage the liver and cause it to inflame.

Symptoms of Hepatitis

Symptoms can vary depending on the type

and severity of the infection. Such symptoms of hepatitis are as follows

i. Nausea and vomiting
ii. Abdominal pain
iii Dark urine
iv. Jaundice

Prevention of Hepatitis

There are several stategies of preventing hepatitis. They are as follows

i. Vaccination
ii Avoid sharing needles
iii Avoid contaminated food and wates
iv. Limit alcohol consumption

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part b

Food Preservation Methods

a. Traditional Methods

i. Drying: This method removes moisture from food, making it difficult for microorganisms to grow

ii. Salting: Salt draws moisture out of food, making an environment inhospitable to microorganisms

iii. Smoking: Smoking exposes food to smoke, which contains antimicrobial compounds

that can help preserve it.

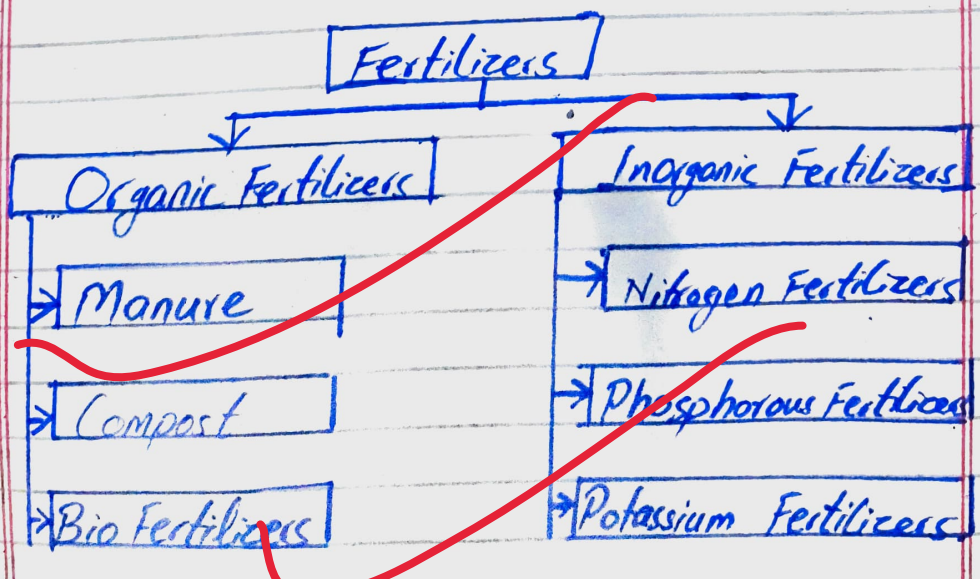
b. Modern Methods

i. Canning: Food is heated to a high temperature to kill microorganisms, then sealed in airtight containers.

ii Freezing: Food is frozen at low temperatures which slows down microbial growth and enzymatic activity

iii Pasteurization: Milk and juices are often pasteurized. Food is heated to a lower temperature than canning, which kills most harmful microorganisms while preserving some nutrients.

Part C



Fertilizers:

Fertilizers are substances added to plants or soil to supply essential nutrients for their optimal growth. Fertilizers are further classified based on their source and composition

a. Inorganic Fertilizers

These type of fertilizers are synthetically produced that provide specific nutrients to plants.

i. Nitrogen Fertilizers:

These are nitrogen rich fertilizers such as Urea, Ammonium Nitrate, etc.

ii Phosphorus Fertilizers:

These are phosphorus rich fertilizers such as Triple Super Phosphate.

iii Potassium Fertilizers:

These are potassium rich fertilizers such as potassium Chloride and potassium Sulfate.

b. Organic Fertilizers

These type of fertilizers are derived from natural sources like plant and animal. They improve soil fertility and structure over time.

i. Manure:
Animal waste such as cow, horse & chicken manure, provides a balanced mixed of nutrients and organic matter

ii Compost:
Decomposed organic matter such as kitchen scraps and yard waste.

iii Biofertilizers:
Microorganisms, like bacteria and fungi, are used to improve soil fertility and plant growth

Part d

Human tooth

The human tooth has several parts, which are as follows

i. Crown: This is the visible part of the tooth above the gum line. It is covered with enamel, which is the hardest substance in the human body.

ii Dentin: This is the layer beneath enamel. It is harder than bone but softer than enamel.

iii. Pulp: This is the innermost part of the

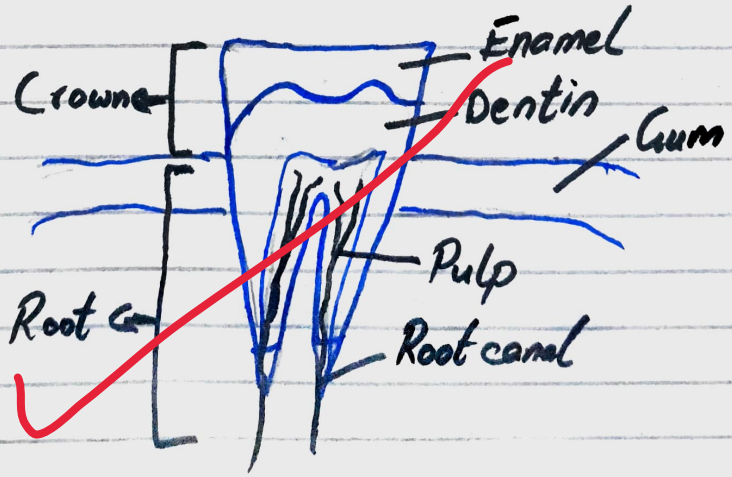
tooth. It contains blood vessels and nerves that provide sensation to the tooth.

iv. **Neck:** This is the area where the crown meets the root, just below the gum line.

v. **Root:** This part is embedded in the jawbone. It helps anchor the tooth in place.

vi. **Cementum** This is a thin layer of bone-like tissue that covers the root of the tooth.

Diagram:



Section II

Question 6

part c

Given Data

Diameter of a circle = 6cm

To find

Circumference of circle
Area of circle

Solution

Circumference of circle = C = $\pi \times$ diameter

$$C = \frac{22}{7} \times 6$$

$$C \cong 18.85 \text{ cm}$$

Area of circle = πr^2

radius = Diameter/2

radius = 6/2

radius = 3 cm

Area of circle = $\frac{22}{7} \times (3)^2$

$$\text{Area} = \frac{22}{7} \times 9$$

$$\text{Area} \cong 28.25 \text{ cm}^2$$

So, the circumference of the circle is approximately 18.85 cm and area of circle is approximately 28.25 cm^2.

part a

Given Data:

Sum of three digit number = 15
Sum of 10^{th} and unit digit = 12
Difference of unit digit from 10^{th} digit = 2

To find

Three digit number = ?

Solution

Lets denote the hundred digit as H, the tens digit as T, and the units digit as U.

Then, $H + T + U = 15$ — ①

$T + U = 12$ — ②

$T - U = 2$ — ③

From eq 2, we can express T as

$$T = 12 - U$$

Substituting this into equation 3, we get

$$(12 - U) - U = 2$$
$$12 - 2U = 2$$
$$-2U = -10$$
$$U = 5$$

Substituting $U = 5$ into equation 2, we get

$$T + 5 = 12$$
$$T = 7$$

Now, substituting $T = 7$ and $U = 5$ into equation 1, we get

$$H + 7 + 5 = 15$$
$$H = 3$$

Therefore, the three-digit number is 375.

part d

i. 13, 24, 46, 90, 178, ?

$(13 \times 2) - 2 = 24$
$(24 \times 2) - 2 = 46$
$(46 \times 2) - 2 = 90$
$(90 \times 2) - 2 = 178$
$(178 \times 2) - 2 = 354$

So, the missing number in this sequence is 354

ii 5, 6, 9, 14, 21, ?

$5 + 1 = 6$
$6 + 3 = 9$
$9 + 5 = 14$
$14 + 7 = 21$
$21 + 9 = 30$

So, the missing number in the sequence is 30.

part b

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.

Question 7
part a

1. Intelligence Quotient (IQ)

a. Definition: This measures cognitive abilities, such as problem-solving logical reasoning and analytical thinking.

b Assessment: Typically measured through standardized tests like the IQ test

c. Examples of skills: i. Logical reasoning
ii. Problem-solving
iii. Critical thinking
iv. Pattern recognition

2. Emotional Quotient (EQ)

a. Definition: This measures emotional abilities such as understanding and managing emotions and social skills.

b. Assessment: Often assessed through self-reflection or personality assessment

c. Examples of skills: i. Empathy
ii Self-regulation
iii. self-awareness
iv. Social skills.