

General Science

f
Ability

Part II

Section - II

Q No. 6 2) Solution

Let the three-digit number be
 xyz .

x is the hundreds digit

y is the tens digit

z is the units digit

Sum of digits: $x + y + z = 15 \rightarrow \text{eq. (1)}$

Sum of tens & units digits:

$$y + z = 12 \rightarrow \text{eq. (2)}$$

Difference between units and the tens digits:

$$z - y = 2 \rightarrow \text{eq. (3)}$$

From $z - y = 2$ we can write:

$$z = y + 2 \rightarrow \text{eq. (4)}$$

Now put eq. (4) in eq. (2)

$$y + (y + 2) = 12$$

$$2y + 2 = 12$$

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$$2y = 12 - 2$$

$$2y = 10$$

$$\frac{2y}{2} = \frac{10}{2}$$

$$\boxed{y = 5}$$

Now put the value of y

in eq. (3)

$$z - y = 2$$

$$z - 5 = 2$$

$$z = 5 + 2$$

$$\boxed{z = 7}$$

Now put the values of y & z

in eq. (1)

$$x + y + z = 15$$

$$x + 5 + 7 = 15$$

$$x + 12 = 15$$

$$x = 15 - 12$$

$$\boxed{x = 3}$$

The three-digit number is: 357 Answer.

b) Solution

Ratio of slices for small, medium and large pizzas = 2:3:4

Total slices required = 18

Weight per slice = 40 gm

Price of small pizza = Rs. 320

Let the number of small, medium and large pizzas be x, y, z respectively. Since the

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Slices are distributed in the ratio 2:3:4,
the total number of slices is:

$$2k + 3k + 4k = 18$$

$$9k = 18$$

$$\frac{9k}{9} = \frac{18}{9}$$

$$\boxed{k=2}$$

Small Pizza slices = $2k = 2(2) = 4$ slices

Medium Pizza slices = $3k = 3(2) = 6$ slices

Large Pizza slices = $4k = 4(2) = 8$ slices

Price of small pizza \rightarrow 4 slices = 320

$$4 \text{ slices} = 320$$

$$1 \text{ slice} = \frac{320}{4} = 80$$

$$\text{Total price} = 18 \times 80 = 1440 \text{ Rs.}$$

$$\text{Total weight} = 40 \text{ gm} \times 18 = 720 \text{ gm}$$

c) Solution

Diameter of the circle = 6 cm

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

$$\text{Circumference} = 2\pi r$$

$$= 2 \times \frac{22}{7} \times 3$$

$$= \frac{132}{7} = 18.84 \text{ cm}$$

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$$\begin{aligned}\text{Area of Circle} &= \pi r^2 \\ &= \frac{22}{7} \times 3^2 \\ &= \frac{22}{7} \times 9 \\ &= \frac{198}{7} = 28.26 \text{ cm}^2\end{aligned}$$

$$\text{Circumference} = 18.84 \text{ cm}$$

$$\text{Area} = 28.26 \text{ cm}^2$$

d) Solution

I. 13, 24, 46, 90, 178, —

Calculate the difference between numbers

$$24 - 13 = 11, \quad 46 - 24 = 22, \quad 90 - 46 = 44$$

$$178 - 90 = 88$$

The differences are: 11, 22, 44, 88

The next difference is $= 88 \times 2 = 176$

Now add in previous term $= 178 + 176$

$$= 354$$

The next term is 354 Answer

II. 5, 6, 9, 14, 21, —

Calculate the differences: $6 - 5 = 1$, $9 - 6 = 3$, $14 - 9 = 5$

$$21 - 14 = 7$$

The differences are = 1, 3, 5, 7

The next difference will be $= 7 + 2 = 9$

Add in previous term $= 21 + 9 = 30$: Next Term is 30 Answer

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Qno-8 a) Solution

Width of room = 60% of length

length of room = 15 ft

Calculate the width:

$$\text{Width} = \frac{3}{10} \times \frac{3}{10} = 9 \text{ ft}$$

The dimensions of the room are:

Length = 15 ft, Width = 9 ft

Answer

b) Solution

$$(\text{Hyp})^2 = (\text{Base})^2 + (\text{Perp})^2$$

$$(\text{Hyp})^2 = (48)^2 + (20)^2$$

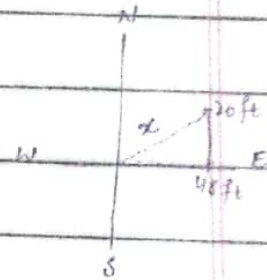
$$(\text{Hyp})^2 = 2304 + 400$$

$$\sqrt{(\text{Hyp})^2} = \sqrt{2704}$$

$$\text{Hyp} = 52 \text{ ft}$$

If Veena had run straight, she would have

run 52 ft.



c) Solution

No. of students = 40

Original Average = 52.15

Incorrect marks added = 49

Correct Marks are = 85

Total Marks = 40 x 52.15

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$$\begin{aligned} \text{Total marks} &= 49 \times 52.15 \\ &= 2086 \end{aligned}$$

Subtract Incorrect marks from total
marks : $2086 - 49 = 2037$

Adding correct marks : $2037 + 85 = 2122$

$$\text{New Average} = \frac{2122}{40} = 53.05$$

Correct Average is 53.05 Answer

d) Solution

People like vegetable Pizza = 37

People like chicken Pizza = 25

People not like Pizza = 3

$$\text{Total People} = 25 + 37 + 3 = 65$$

Probability of people like chicken

Pizza:

$$P(\text{chicken Pizza}) = \frac{\text{Number of People like chicken Pizza}}{\text{Total People}}$$

$$= \frac{25}{65}$$

$$= \frac{5}{13} \approx 0.3846$$

Answer

Section - I

Q.No. 2 a) Answer

Definition

Lipids are a diverse group of organic compounds that are insoluble in water but soluble in non-polar solvents such as chloroform and ether. They play a vital role in the structure and function of living cells. Lipids are primarily composed of carbon, hydrogen, and oxygen atoms with a lower proportion of oxygen compared to carbohydrates.

Types of lipids

Lipids can be classified into the following major types:

I. Fats and Oils (Triglycerides):

These are composed of glycerol and three fatty acids, they serve as a major source of energy storage.

II. Phospholipids:

These contain a glycerol backbone, two fatty acid tails, and a phosphate group. They are a key component of cell membranes, providing structural integrity and fluidity.

III. Steroids:

These are complex molecules with a four-ring structure. Cholesterol is a well-known steroid that serves as a precursor for the synthesis of hormones like testosterone and estrogen.

IV. Waxes:

Waxes are long-chain fatty acids esterified with long-chain alcohols. They are found on the surfaces of leaves and animals skins to prevent water loss.

Functions of Lipids

Lipids perform several biological

functions:

- I. Lipids are storage compounds, triglycerides serve as reserve energy of the body.
- II. Lipids regulate membrane permeability.
- III. They serve as source for fat soluble vitamins like A, D, E & K.
- IV. Lipids are components of some enzyme systems.
- V. They protect many vital organs like heart and kidney.
- VI. Body temperature maintenance is done by brown fat.

b) Answer

Introduction:

Energy conservation refers to reducing energy consumption through efficient usage, while sustainable use ensures that energy resources are utilized in a way that meets present needs without compromising future generations ability to meet their own.

Measures For Energy Conservation & Sustainable Use:

I. Energy-Efficient Appliances:

Use energy-efficient appliances like LED bulbs, energy-star-rated electronics and energy-saving air conditioners to reduce electricity consumption.

II. Renewable Energy Resources:

Shift from fossil fuels to renewable energy sources such as solar, wind and hydropower to ensure sustainable energy use.

III. Energy Audits:

Conduct regular energy audits to identify areas of energy wastage and

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develop strategies to improve energy efficiency.

IV. Smart Grids and Smart Meters:

Use smart grids and meters to optimize energy distribution, reduce peak demand, and track energy usage in real time.

V. Building Design and Insulation:

Design energy-efficient buildings with proper insulation, natural lighting and ventilation to reduce reliance on artificial heating, cooling and lighting systems.

VI. Energy Efficient Transportation:

Promote the use of electric vehicles (EVs) and hybrid cars to reduce reliance on fossil fuels.

VII. Industrial Efficiency:

Implement energy-efficient technologies in industrial processes, such as using waste heat recovery systems and optimizing production processes.

c) Answer

Definition:

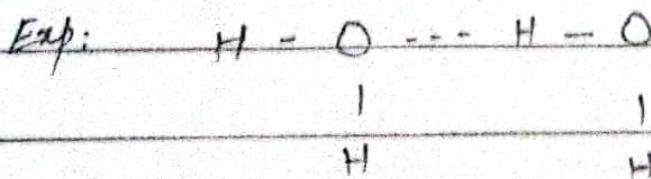
Hydrogen bonding is a type of weak chemical bond that occurs when a hydrogen atom, which is covalently bonded to highly electronegative atom experiences an electrostatic attraction to another electronegative atom in a nearby molecule or within the same molecule.

Hydrogen bonds are stronger than van der Waals forces but weaker than covalent or ionic bonds.

Structures as Examples

I. Water (H_2O)

Structure: In a water molecule, the oxygen atom is more electronegative than hydrogen atoms, creating a partial negative charge on oxygen and a partial positive charge on hydrogen. This polarity allows hydrogen atoms from one water molecule to form hydrogen bonds with oxygen atoms of neighboring water molecules.



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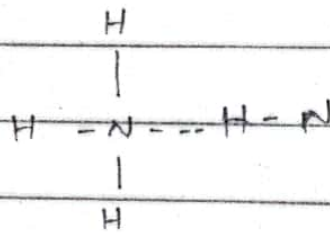
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Effect: This hydrogen bonding explains the high boiling point, surface tension, and cohesive properties of water.

II. Ammonia (NH₃):

Structure: The nitrogen atom in ammonia has a lone pair of electrons that can form a hydrogen bond with a hydrogen atom from another NH₃ molecule.

Example:



Effect:

The hydrogen bonding in ammonia influences its solubility in water and its boiling point.

Hydrogen bonding plays a significant role in the properties of water, the structure of biological macromolecules, and the solubility of many organic and inorganic compounds.

d) Answer

Introduction:

The human nervous system is a highly complex and intricate network responsible for controlling and coordinating the body's activities. It allows the body to perceive, process, and respond to internal and external stimuli. The nervous system is crucial for maintaining homeostasis, enabling communication between different body parts and facilitating cognitive functions like thought, memory and emotion.

Components of Nervous System:

I. Central Nervous System (CNS):

a) Brain: The brain is the control center of the body, responsible for processing sensory information, decision-making, emotions and controlling voluntary and involuntary activities. It is divided into the cerebrum, cerebellum and brainstem.

b) Spinal cord: The spinal cord is a cylindrical structure that extends from the brainstem and serves as a communication pathway between the brain

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and the rest of the body. It also controls reflex actions.

II. Peripheral Nervous System (PNS).

a) Somatic Nervous system: This system controls voluntary movements of skeletal muscles and transmits sensory information to the CNS.

b) Autonomic Nervous System: The ANS regulates involuntary functions such as heart rate, breathing, digestion and glandular activity.

Functions of Nervous System:

I) Sensory Input: It detects changes inside and outside the body using sensory receptors and transmits this information to the CNS.

ii) Integration: The CNS processes sensory input, interprets it, and decides the appropriate response.

iii) Motor output: The CNS sends signals to muscles or glands to carry out a response, such as muscle contraction or secretion of hormones.

iv) Cognitive Functions: The brain supports higher-order functions, such as thinking, memory, decision making, language, and emotions.

Q No. 4 a) Answer

Definition:

Hepatitis refers to the inflammation of the liver, often caused by viral infections, but it can also result from alcohol abuse, toxins, certain medications and autoimmune diseases.

Causes:

- I) **Viral Infections:** The most common cause, classified into types A, B, C, D & E.
- II) **Alcohol Abuse:** Excessive alcohol consumption damages liver cells, leading to hepatitis.
- III) **Medications and Toxins:** Prolonged use of certain drugs and exposure to toxic chemicals can trigger hepatitis.
- IV) **Autoimmune Disorders:** The immune system may mistakenly attack liver cells, causing autoimmune hepatitis.

Symptoms:

- I) Fatigue
- II) Jaundice
- III) Nausea and vomiting
- IV) Abdominal pain or discomfort
- V) Dark-colored urine and pale stools
- VI) Loss of appetite

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Prevention:

I) Vaccination:

Vaccines are available for hepatitis A and B.

II) Good Hygiene:

Proper handwashing and sanitation help prevent hepatitis A & E.

III) Safe Practices:

Avoid sharing needles, use protection during sexual activities and ensure safe blood transfusions to prevent hepatitis B and C.

IV. Alcohol Moderation:

Limit alcohol consumption to prevent liver damage.

Qno. 4 b) Answer

Methods of Food Preservation

1) Refrigeration and Freezing:

Cooling slows down the activity of bacteria, while freezing halts microbial growth completely.

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II) Pasteurization:

Heating food to a specific temperature for a set time to kill harmful microorganisms.

III) Canning:

Sealing food in airtight containers after heating to destroy microorganisms.

IV) Drying (Dehydration):

Removing water from food to inhibit microbial growth.

V) Salting and Sugaring:

Salt and sugar draw water out of the food and microbial cells, preventing their growth.

VI) Vacuum Packing:

Removing air from food packaging to prevent oxidation and microbial growth.

VII) Chemical Preservation:

Adding preservatives like benzoates and sorbates to food to extend shelf life.

Qno. 4 (c) Answer

Definition:

Fertilizers are natural or synthetic substances that supply essential nutrients to plants, enhancing their growth and increasing crop yield.

Types of fertilizers:

I) Organic Fertilizers:

Derived from natural sources like animal manure, compost and plant residues. They improve soil structure and provide long-term soil fertility.

II) Inorganic Fertilizers:

These are synthetic fertilizers containing essential nutrients like nitrogen (N), phosphorus (P) and Potassium (K).

III) Biofertilizers: contain living microorganisms like bacteria, fungi or algae, which help fix atmospheric nitrogen and improve soil fertility.

IV) Micro-nutrient Fertilizers:

Supply trace elements like zinc, iron and copper which are vital

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For plant growth.

Uses:

Fertilizers are applied to the soil to boost crop production, replenish depleted soil nutrients and promote healthy plant growth.