

PART : 2

Q. No. 2

a) "Data is the new oil". Do you agree? Justify with your simple opinion and 3 everyday examples?

Answer:-

Yes, I strongly agree with the analogy that "Data is the new oil". This metaphor is powerful because it captures the immense economic and strategic value of data in the 21st century, much like oil in the 20th. Both are raw resources that require extraction, refinement, and distribution to become truly valuable and drive progress. In its raw form, crude oil is not very useful, but once refined, it powers industries, transportation, and economies. Similarly, raw data (user behavior, location points, transaction records) is unstructured. When collected, cleaned, analyzed, and interpreted—a process akin to refinement—it fuels innovation, optimizes systems, personalizes experiences, and drives decision-making across all sectors.

Everyday Examples:

1 Personalized Social Media Feeds:

Platforms like Facebook, TikTok and Instagram are prime examples. They extract data on your likes, shares, watch time, and interactions. This data is refined by complex algorithms to understand your preferences. It is then utilized to curate a highly personalized feed and target you with specific advertisements, keeping you engaged and generating immense advertising revenue.

2 E-commerce Recommendations:

When you shop on Amazon or Daraz, every click, search, and purchase is data. The platform refines this data to identify patterns and relationships between products ("Customers who bought X also bought Y"). This refined information is utilized to provide personalized product recommendations, significantly increasing the likelihood of additional sales and enhancing customer satisfaction.

3 Real-Time Navigation and Traffic Apps:

Applications like Google Maps and Waze constantly extract anonymized location and movement data from millions of users. This data is refined in real-time

to analyze traffic flow, identify jams, and calculate optimal routes. It is utilized to provide users with accurate Estimated Times of Arrival (ETAs), suggest faster alternatives, and even inform urban planning.

←————→
b) Universe is expanding, how it resembles with balloon blowing in working?

Answer:-

The analogy of a balloon blowing up is one of the most effective ways to visualize the expansion of the universe. Imagine the surface of a balloon as the fabric of the universe itself (we ignore the 3D interior for this analogy). Now, mark several dots on the balloon to represent galaxies.

As you inflate the balloon, its surface area stretches and expands. From the perspective of any single dot (galaxy), all the other dots are moving away. Crucially, there is no "center" of the expansion on the balloon's surface; every point is moving away from every other point. A dot in one region does not see itself as the center; it sees all other dots receding.

This directly resembles our observations of the universe:

◆ Galaxies are moving apart: Edwin Hubble's observations confirmed that distant galaxies are receding from us, with their light shifted towards the red end of the spectrum (redshift).

◆ No Central Point: The expansion is not happening from a single point in space. Rather, space itself is stretching everywhere. We are not at the center of the universe; an observer in any other galaxy would see the same thing - all other galaxies moving away.

◆ The "Fabric" of Space: The balloon's rubber represents the fabric of spacetime, which is what is truly expanding, carrying galaxies along with it.

C) What do you mean by balanced diet? Deficiency of vitamins A, D and E can result into what type of imbalances in human body?

Answers:-

A balanced diet is one that provides the human body with all the essential nutrients - carbohydrates, proteins, fats, vitamins, minerals and water - in the correct proportions and

quantities necessary to maintain optimal health, support growth and development, and provide energy for daily activities. It emphasizes variety and moderation from all major food groups: grains, fruits, vegetables, protein sources, and dairy.

Deficiency-Related Imbalances:

* Vitamin A Deficiency:

This primarily affects vision and immune function.

→ Imbalances:

It leads to night blindness (Nyctalopia), where the eye cannot adjust to dim light.

Severe deficiency causes Xerophthalmia, a condition that can dry out the cornea and conjunctiva, leading to corneal ulcers, scarring, and permanent blindness. It also weakens the immune system, making body more susceptible to infections like measles and diarrhea.

* Vitamin D Deficiency:

This is crucial for calcium absorption and bone health.

→ Imbalances:

In children, it causes Rickets, a disease characterized by soft, weak and deformed bones.

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leading to bow legs, stunted growth, and bone pain. In adults, the equivalent is Osteomalacia, which results in widespread bone pain, muscle weakness, and an increased risk of fractures. It is also linked to an increased risk of autoimmune diseases.

* Vitamin E Deficiency:

this is rare but serious, as Vitamin E is a powerful antioxidant.

→ Imbalances:

It primarily causes neurological problems due to impaired nerve function.

Symptoms include ataxia (loss of body movement control), muscle weakness, and peripheral neuropathy (tingling or numbness in hands and feet). It can also lead to vision problems and a weakened immune response.

d) Discuss working of GPS. What is fiber optic? How 2D and 3D locations are measured by satellites?

Answer:-

Working of GPS:

The Global Positioning System (GPS) is a

satellite-based navigation system consisting of a constellation of at least 24 satellites orbiting the Earth. Each satellite continuously transmits a radio signal that contains its precise location and the exact time the signal was sent. A GPS receiver (in your phone or car) picks up these signals from multiple satellites. By calculating the time difference between when the signal was sent and when it was received, the receiver can determine its distance from each satellite ($\text{Distance} = \text{Speed of light} \times \text{Time Delay}$). With distances known from several satellites, the receiver uses a mathematical process called trilateration to pinpoint its own location on Earth.

→ What is Fiber Optic?

Fiber optic is a technology for transmitting information as pulses of light through thin, flexible strands of glass or plastic called optical fibers. A fiber optic cable consists of a core (which the light travels through), surrounded by cladding that reflects the light back into the core, minimizing signal loss. This allows for the transmission of vast amounts of data over long distances at

speeds approaching the speed of light, with higher bandwidth and less interference than traditional metal cables.

It is the backbone of modern internet, telecommunications, and cable television.

2D vs 3D Location Measurement:

* 2D location (Latitude and Longitude): To calculate a 2D position on a map, the GPS receiver needs signals from a minimum of three satellites. The intersection of the distance spheres from these three satellites gives a two-dimensional fix, providing the receiver's latitude and longitude. This is sufficient for basic mapping on a flat surface.

3D location (Latitude, Longitude, and Altitude):

To determine altitude, a fourth satellite is essential. This is because the calculation from three satellites often results in two possible points of intersection (one in space, one on earth). The single signal from the fourth satellite allows the receiver to resolve this ambiguity and precisely calculate the three-dimensional position, including elevation.

Q: No: 4:-

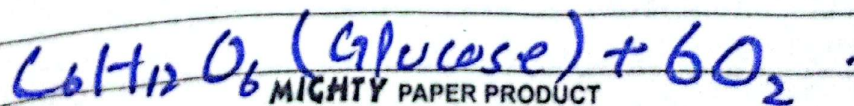
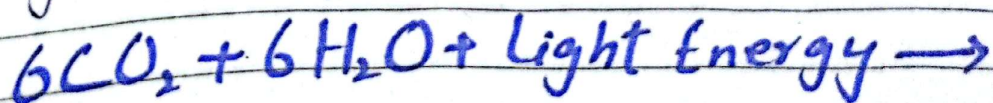
a) Write a note on plant Kingdom "Chlorophyll"?

Answer:-

Chlorophyll is the vital, life-sustaining green pigment found in the chloroplasts of plants, algae, and cyanobacteria. It is the cornerstone of the plant kingdom and, by extension, most life on earth, as it is the primary molecule responsible for photosynthesis.

Its most critical function is to absorb light energy from the sun. Chlorophyll molecules are exceptionally efficient at absorbing light in the blue and red portions of the visible light spectrum, while reflecting green light, which is why plants appear green to our eyes. This absorbed light energy is then converted into chemical energy.

The process it enables, photosynthesis, can be summarized by the equation:



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through this process, chlorophyll uses solar energy to combine carbon dioxide and water to produce glucose (a simple sugar that serves as food for the plant) and oxygen, which is released as a byproduct. this oxygen is essential for the respiration of most living organisms. therefore, chlorophyll is not just a pigment but the very engine that drives the conversion of inorganic matter into organic energy, forming the base of the food web and maintaining the earth's atmospheric balance.

b) Describe role of ribosomes in protein synthesis?

Answer:

Ribosomes are intricate molecular machines, often described as the "protein factories" of the cell. they play the central role in translation, the second stage of protein synthesis, where the genetic code carried by messenger RNA (mRNA) is decoded to build a specific protein. their role can be broken down into key steps.

1. mRNA Binding:

After DNA is transcribed into mRNA in the nucleus, the mRNA travels to the cytoplasm and attaches to a ribosome.

2. Initiation:

The ribosome identifies the start codon (AUG) on the mRNA sequence.

3. Elongation:

The ribosome ~~identifies~~ moves along the mRNA strand, reading its sequence in groups of three nucleotides called codons. For each codon, it recruits the corresponding transfer RNA (tRNA) molecule, which carries a specific amino acid. The ribosome then catalyzes the formation of a peptide bond between the incoming amino acid and the growing polypeptide chain.

4. Termination:

When the ribosome encounters a stop codon, it releases the completed polypeptide chain and dissociates from the mRNA.

Ribosomes can be found floating freely in the cytoplasm (producing

proteins for use within the cell) or bound to the Rough Endoplasmic Reticulum (producing proteins destined for export from the cell or for membranes).

c) Discuss different methods of solid waste Management;
Answer:

* Landfilling: Waste disposal in designated areas.

* Incineration: Burning waste to reduce volume and generate energy.

* Recycling: Processing waste into new products.

* Composting: Decomposing organic waste into fertilizer.

Waste Reduction:

minimizing waste through reuse and efficient practices.

d) Define the terms:



* Biofuel:

Fuel derived from organic matter (e.g) ethanol (corn)

* Adulteration:

Adding inferior substances to products, reducing quality.

* Hydrosphere:

All water on earth's surface (oceans, lakes, etc).

* Troposphere:

The lowest layer of earth's atmosphere where weather occurs.

* Isotopes:

Atoms of the same element with different numbers of neutrons.

Section II

Q. No. 6:

a) A store has packets of candies in flavors Apple, Berry, Cherry and Data in the ratio 3:6:2:5. If Apple candies exceed Data candies by 35, how many Berry candies are there?

Assuming "Apple candies exceed Data candies" is a typo and it should be "Data candies exceed Apple candies by 35"

• let the common ratio be x . then,
Apple = $3x$, Data = $5x$.

• Data exceeds Apple by 35: $5x - 3x = 35$
 $2x = 35 \rightarrow x = 17.5$

• Berry candies = $6x = 6 \times 17.5$
 $= 105$

$= 105$ Berry Candies Ans.

b) A camera priced at 2000 gets 25% off plus 6% tax. Calculate the total amount paid.

Soln:

= price after 25% discount:
= Tax at 6%;

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Total amount paid = ?

First, calculate the price after 25% discount.

Discount = 25% of 200

$$= \frac{25}{100} \times 200 = 50 \$$$

Price after discount = $200 - 50 = 150 \$$

Then, add 6% tax on the discounted price.

Tax = 6% of 150

$$= \frac{6}{100} \times 150 = 9 \$$$

Total amount paid = $150 + 9$

$$= 159 \$$$

159\$ Ans.



c) A bicycle covers 36 km at 18 km/hr starting at 1 pm. What time does it reach?

Soln

calculate the time taken.

$$\text{Time} = \frac{\text{Distance}}{\text{speed}}$$

$$= \frac{36}{18} = 2$$

= 2 hours ~~1 hour~~

Add the time to the start time.

$$1 \text{ pm} + 2 \text{ hours} = 3 \text{ pm}$$

Final Answer

3 pm .



d) Unscramble these math terms: (i) STS TAICITS (ii) LGEBMAR.

Soln ..

① Unscramble "STS TAICITS".
Rearranging the letters gives.

STATISTICS.

② Unscramble "LGEBMAR".

Rearranging the letters gives

ALGEBRA

(assuming "M" is a typo for "A").

Final Ans:

STATISTICS .

ALGEBRA .



Q: No. 7

a) Calculate volume of sphere with diameter 14cm. (Use $\pi = \frac{22}{7}$)

Step 1:

find the radius.

$$\text{Radius} = \frac{\text{Diameter}}{2}$$

$$= \frac{14}{2}$$

$$\text{Radius} = 7\text{cm}$$

Step 2:

Use the volume formula for a sphere.

$$V = \frac{4}{3} \pi r^3$$

$$= \frac{4}{3} \times \frac{22}{7} \times 7^3$$

Step 3:

Simplify step-by-step.

$$7^3 = 343$$

$$V = \frac{4}{3} \times \frac{22}{7} \times 343 = \frac{4}{3} \times 22 \times 49 =$$

$$= \frac{4}{3} \times 1078 = \frac{4312}{3} \text{ cm}^3$$

$$\frac{4312}{3} \text{ cm}^3$$

or

$$1437.33 \text{ cm}^3$$



b) Five friends total savings = 25,000
Rs. ratio 1:2:3:4:5, Find the smallest share.

Soln:-

step 1 = find the total ratio parts.

$$1 + 2 + 3 + 4 + 5 = 15$$

step 2

$$\text{one part} = \frac{25000}{15} =$$

$$= \frac{5000}{3}$$

$$\approx 1666.67$$

step 3: the smallest share corresponds to ratio 1.

$$\text{Smallest share} = 1 \times \frac{5000}{3}$$

$$= \frac{5000}{3}$$

$$\approx 1666.67 \text{ Rs.}$$

$$\frac{5000 \text{ Rs}}{3}$$

$$1666.67 \text{ Rs.}$$



c) Spot the error/complete the series:

(i) 2, 6, 18, 54, 162, 486
(which number doesn't fit).

(ii) 3, 5, 7, 11, 13, —

Soln.

Step 1: Analyze series (i)

Each term is multiplied by 3:

$$2 \times 3 = 6, 6 \times 3 = 18, 18 \times 3 = 54, \\ 54 \times 3 = 162, 162 \times 3 = 486.$$

All terms fit the pattern = No error

Step 2: Analyze series (ii)

The series lists prime numbers
3, 5, 7, 11, 13. The next prime is
17.

3, 5, 7, 11, 13, 17

Final Answer

(i) No error.

(ii) 17.

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d) A triangle with sides 5cm, 12cm, 13cm. Find all three angles?

Soln

step 1: check if it is a right triangle.

$$5^2 + 12^2 = 25 + 144 = 169 = 13^2$$

it is a right triangle with the right angle opposite the 13cm side

step 2: Find angle A opposite side 5cm.

$$\sin A = \frac{5}{13}$$

$$\Rightarrow A = \sin^{-1}\left(\frac{5}{13}\right)$$

$$\approx 22.62^\circ$$

step 3: find angle B opposite side 12cm.

$$\sin B = \frac{12}{13}$$

$$\Rightarrow B = \sin^{-1}\left(\frac{12}{13}\right)$$

$$\approx 67.38^\circ$$

step 4: The Third angle is 90° .

Final Ans

$$22.62^\circ$$

$$67.38^\circ$$

$$90^\circ$$