

General Science and Ability

Part - II

Section - I

Q.No. 02

(a)

Dengue:-

Dengue is a viral infection caused by the dengue virus which is transmitted to human beings through the bites of infected *Aedes* mosquitos especially *Aedes aegypti* and *Aedes albopictus*.

Causative Agents:-

⇒ There are 04 distinct but closely related serotypes of the virus that cause dengue (DEN-1, DEN-2, DEN-3 and DEN-4).

⇒ Infection with one serotype provides lifelong immunity to that particular serotype but only partial and temporary immunity to the other serotypes.

Symptoms:-

Dengue symptoms usually

appear 04-10 days after the bite from an infected mosquito and can last for 02-07 days.

1. Sudden high fever
2. Severe headache
3. Pain behind the eyes
4. Nausea and vomiting
5. Skin rash
6. Mild bleeding symptoms.

(b)

Dark Matter:-

Dark matter is a form of matter that does not emit, absorb or reflect light making invisible to current instruments.

Composition:-

The composition of Dark matter consist of dissolved particles sometimes hypothesized to be weakly interacting massive particles or axions.

Evidence & Role:-

- ⇒ Its presence is inferred from its gravitational effects on galaxies and galaxy clusters.
- ⇒ Dark matter provides the "scaffolding" of the universe, helping galaxies and

other structures form and remain stable.

Dark Energy:-

The form of energy that is hypothesized to permeate all of space accelerating the expansion of the universe.

Composition:-

Dark energy has properties that counteract gravity, causing galaxies to move away from each other at increasing speeds.

Evidence & roles:-

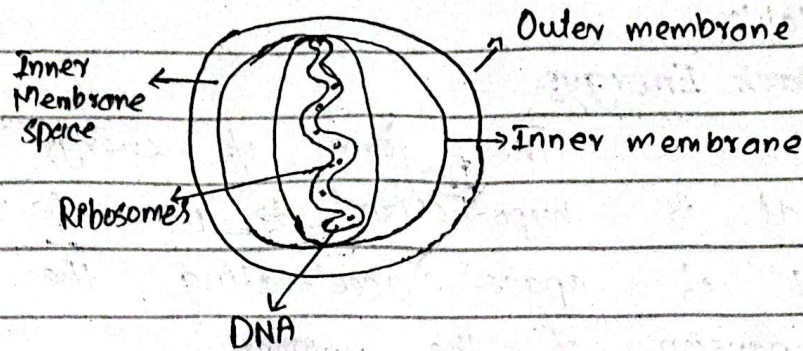
The cosmic microwave background radiation also supports the idea of dark energy influencing the universe's expansion.

(c)

Mitochondria:-

Mitochondria often called the "powerhouse of the cell" are essential organelles found in most eukaryotic cells.

Structure:



- i. Mitochondria is double membroned and self-replicating cell organelle.
- ii. The inner part of the mitochondrion contains enzymes, mitochondrial DNA and ribosomes.

Functions-

- i. The process of cellular respiration takes place.
- ii. The production of glycolysis and Citric acid cycle also takes place.

Power house-

It is often called power house of cell because of ATP synthesis that provides power for cellular activities.

(d)

Covalent Bonds:-

Covalent bonds are chemical bonds formed when two atoms share one or more pairs of electrons.
=> This sharing is to stabilize "Octet rule"

Types of Covalent Bonds:-

1. Single Covalent Bonds:-

In single covalent bond, one pair of electrons is shared between two atoms.

Example:- Hydrogen molecule (H_2)

Each hydrogen atom shares one electron forming stable H_2 molecule.

Structure:- $H - H$.

2. Double Covalent Bonds:-

In double covalent bond involves two pairs of electrons is shared between two atoms.

Example:- Oxygen molecule (O_2).

Each oxygen atom shares two electrons.

Structure: $O=O$

Triple Covalent Bonds:

In a triple covalent bond, three pairs of electrons are shared between atoms.

Example: Nitrogen molecule (N_2). Each nitrogen atom shares three electrons with other atom.

Structure: $N \equiv N$

Q. No. 04

(a)

Noise pollution:

The presence of excessive, unwanted, or harmful sounds in the environment.

⇒ It is primarily caused by human activities such as transportation, industrial processes, construction and urban development.

Effects:

① Human health effects like hearing loss, cardiovascular issues, sleep disturbances, mental impacts

② Environmental and wildlife effects like disruption of ecosystems, habitat fragmentation and marine life impact.

Ways to curb Noise pollution:-

Following are the ways to curb noise pollution.

- ① By urban planning and zoning of industrial activities away from residential areas.
- ② By improving transportation management.
- ③ By use of soundproof technologies
- ④ By promoting green spaces and Buffer zones.

(b)

Fibers:-

Fibers are essential in maintaining digestive health and overall well-being.

Soluble fibers:-

Dissolves in water to

form a gel-like structure which helps lower blood cholesterol and glucose level.

⇒ Sources include oats, apples, carrots and legumes.

Insoluble Fibers:

Does not dissolve in water and adds bulk to stool, promoting regular bowel movements and preventing constipation.

⇒ Sources include grains, nuts and vegetables.

Importance of fibers:

Fibers regulates digestive health, blood sugar control, weight management and heart health.

Characteristics of a balanced Platters:

A balance food platter provides the right proportions of all essential nutrients, including fats, proteins, carbohydrates, vitamins, minerals and water

⇒ It oftenly consist of half plate

with fruits and vegetables, one-quarter of the plate with proteins and grains each and healthy fats.

(c)

Drinking water:-

The World Health Organization and the Environmental Protection Agency establish drinking water quality standards to ensure water safety for public consumption.

Drinking water Quality:-

① Following are the physical parameters for drinking water quality like turbidity, color, taste and odor and temperature.

② Following are the chemical parameters for drinking water quality like pH level, hardness, nitrates and nitrites, heavy metals, chlorine and chloramines and fluoride.

③ Pathogens and total coliforms are biological parameters.

Drinking water standards:-

Following drinking water standard set by WHO and EPA

	WHO	EPA
Lead	0.01 mg/L	0.015 mg/L
Arsenic	0.01 mg/L	0.01 mg/L
Nitrate	50 mg/L	10 mg/L
Fluoride	1.5 mg/L	4.0 mg/L

(d)

Lithosphere:-

⇒ The outermost layer of the Earth consisting of the crust and uppermost part of the mantle.

⇒ The lithosphere is divided into tectonic plates that move and interact leading to geological phenomena like earthquakes, volcanic activity and mountain formation.

Rocks:-

Rocks are naturally occurring

Solids made of one or more minerals.

Types:-

i. **Igneous rocks** → formed from the cooling and solidification of molten magma or lava. e.g. Granite.

ii. **Sedimentary rocks** → formed from the accumulation, compaction and cementation of minerals and organic particles e.g. Shale.

iii. **Metamorphic rocks** → formed when existing rocks undergo changes in pressure, temperature leading to recrystallization e.g. marble.

Minerals:-

The inorganic substances with a specific chemical composition.

⇒ Each mineral has a unique arrangement of atoms, giving it distinctive physical properties such as color, hardness, luster, and cleavage.

Examples:- Quartz, Feldspar, and Calcite are examples of minerals.

Q. No. 08

(a)

Solution:-

$$\text{charge} = £20 + 4n$$

$$\text{Number of windows} = 7$$

$$\text{Total cost of windows cleaned} = ?$$

Sol:-

$$\text{Charge} = £20 + 4n$$

$$= £20 + 4(7)$$

$$= £20 + 28$$

$$= £48 \text{ Answer.}$$

(b)

Solution:-

Ralciap → Replica

Tyhnium → Humanity

arshcc → Search

moniteah → emotional

Tareph → father.

(c)

Given Data:-

$$A = \{10, 11, 12, 13, 15\}$$

$$B = \{10, 12, 14\}$$

$$U = \{10, 11, 12, 13, 14, 15, 16, 18\}$$

Sol:-

$$A \cup B = \{10, 11, 12, 13, 14, 15\}$$

The union $A \cup B$ includes all elements that are in A or B .

$$(A \cup B)' = U - (A \cup B) = \{16, 18\}$$

It denotes all elements that are not in $A \cup B$.

$$A' = U - A = \{14, 16, 18\}$$

All elements in U that are not in A .

$$B' = U - B = \{11, 13, 15, 16, 18\}$$

All elements in U that are not in B .

$$A' \cap B' = \{16, 18\}$$

The intersection of A' and B' which includes all elements common to both A' and B' .

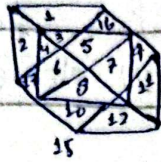
$$(A \cup B)' = \{16, 18\} \text{ and } A' \cap B' = \{16, 18\}$$

That's why,

$$(A \cup B)' = A' \cap B' \text{ Answer.}$$

(d)

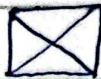
Solution:-



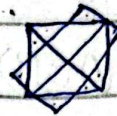
$$= 12$$



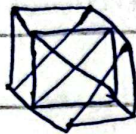
$$= 02$$



$$= 04$$



$$= 08$$



$$= 12$$

Total Triangle = 38 Answer.

Q.No. 06

(a)

Given Data:-

$$\rightarrow 9, 8, 10, K, 12$$

$$\rightarrow \text{Mean} = 15$$

Solution:-

$$\begin{aligned} \text{Arithmetic Mean} &= \frac{9+8+10+K+12}{5} \\ &= 15 \rightarrow \text{①} \end{aligned}$$

$$\begin{aligned} \text{Sum of Total No.} &= 9+8+10+12 \\ &= 39 \end{aligned}$$

Substitute in eq \rightarrow ①

$$\frac{39+K}{5} = 15$$

$$39+K = 15 \times 5$$

$$K = 75 - 39$$

$$K = 36 \text{ Answer.}$$

(b)

Given data:-

Ratio of sugar solution

and colored water = $4x:3x$

After adding water

$$3x + 10$$

New ratio of sugar solution

$$\frac{4x}{3x+10} = \frac{4}{5}$$

Solution:-

$$\frac{4x}{3x+10} = \frac{4}{5}$$

$$4x \times 5 = 4(3x+10)$$

$$20x = 12x + 40$$

$$20x - 12x = 40$$

$$8x = 40$$

$$x = \frac{40 \times 5}{8} = 5$$

Quantity of sugar solution

$$= 4x$$

$$= 4(5)$$

$$= 20 \text{ litres Answers.}$$

(c)

Given Data:-

Radius of football = 12cm

Solution:-

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

$$V = \frac{4}{3} \pi (12)^3$$

$$V = \frac{4}{3} \pi (1728)$$

$$V = \frac{4 \times 1728}{3} \pi$$

$$V = \underline{2304 \pi \text{ cm}^3} \text{ Answer.}$$

Given Data: (d)

-10, -8, 6, 40, 102, ?

Solution:-

$$-8 - (-10) = -8 + 10 = 2$$

$$6 - (-8) = 6 + 8 = 14$$

$$40 - 6 = 34$$

$$102 - 40 = 62$$

The differences are increasing by

12 each time. So, the next

difference should be $62 + 12 = 74$

So, next number

$$= 102 + 74 = \underline{176} \text{ Answer.}$$