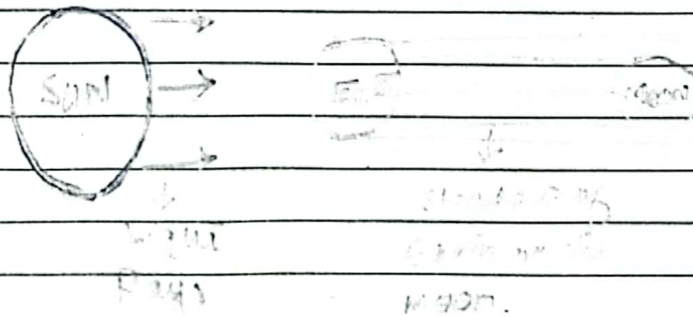


Q:3:1) What is lunar Eclipse? Explain in details with apt diagrams.

Lunar Eclipse:: During a lunar eclipse, Earth gets in the way of the sun's light hitting the moon that means that during the night a full moon fades away on earth's shadow covers it up.

The moon can also look reddish because earth's atmosphere absorbs the other colours, while it bends some of sunlight towards the moon. Sunlight bending through the atmosphere and absorbing other colours is also what's why sunsets are orange and red.

During a total lunar eclipse the moon is shining from all the sunrises and sunsets occurring on earth.



2) Explain function of enzymes in details with examples?
 Enzymes are biological catalysts that increase a chemical reaction by lowering the activation energy required for the reaction to occur. Enzymes are composed of proteins and possess an active site where specific substrate binds to form enzyme-substrate complex. This binding often changes the enzyme shape, enhancing its catalytic efficiency. Various enzymes are present in human body. For instance, an enzyme complex which is found in saliva, catalyzes the breakdown of starch into sugars.

while pepsin an acidic protease in the stomach facilitates protein digestion by breakdown of complex protein molecules into simpler compounds. Similarly lipase catalyses the hydrolysis of fats into glycerol and fatty acids. Enzyme DNA polymerase is essential for DNA replication and synthesizing of new DNA complementary strands. Additionally enzymes can be influenced by various factors like pH, temperature, substrate concentration and presence of inhibitors or activators, which can enhance or decrease their activity. Overall enzymes are vital for metabolic pathways and cellular functions, making them essential for maintaining homeostasis and supporting life.

c) Give a brief account of Electromagnetic radiations. What is EM spectrum?

Electromagnetic Radiations - Electromagnetic waves or radiations is a form of energy that travels through space at the speed of light consisting of waves of electric and magnetic fields that move together. These radiations come in many forms which are collectively known as electromagnetic spectrum. Examples include radio waves, microwaves, infrared radiations, visible light, ultraviolet light, X-rays and Gamma rays. Each type of electromagnetic radiations has different wave length and frequency which determines its property and uses.

Electromagnetic spectrum - It is a range of all types of electromagnetic radiations, which are waves of energy that travels through space at the speed of light. This spectrum is organized based on the wavelength and frequency of waves, from long wavelength with low frequency to short wavelength with high frequency. Each type of radiations in the spectrum has different properties and uses.

a) Are earthquakes and volcanic eruptions interconnected if yes than how.

Earthquake :- The shaking of the earth's surface caused by the rapid movement of the earth's outer layer. Earthquake occurs when energy stored within the earth, usually in the form of strain in rocks, suddenly releases. This energy is transmitted to the surface of the earth by earth-quake waves. Earthquake are also caused by sudden slip along geological faults, which slips because of the movement of Earth's tectonic plates. This concept is called the elastic rebound theory. The rocky tectonic plates move very slowly, floating on a top of weaker rocky layer. As the plates collide or slide, pressure builds up within the rocky crust & this increase in pressure results in an earthquake.

Volcanoes :- The earth's mantle is made up of molten materials and gases. Molten materials are solid rock turned into liquid because of extreme heat inside the earth. The molten rocks and gases inside the earth is called magma, it is liquid made up of many crystal fragments and gases, including oxygen, silicon, iron, Aluminium, magnesium and manganese.

Whenever extreme pressure is builds in the mantle an eruption is likely to happen. During eruption molten materials push out through spaces in the crust to the surface. This eruption can be in the form of lava fragments shooting into the atmosphere and forming thick clouds of lava. Fresh lava believes to about 2200°F.

The earthquake and lava are interconnected and we call it volcanic earthquake as molten rock called magma is stored under volcanoes. As the magma moves upward, it can fracture the rock it squeezes through, causing earthquake usually with magnitude not more than 5.0.

Q:1:) ~~What is noise pollution?~~ Give its harmful effects and ways to curb?

Noise pollution:

Q:2:a) What is dengue? Give a brief account of its causative agent and its symptoms?

Dengue Fever: - It is a viral infection that is transmitted to humans through the bites of an infected Aedes mosquito. Dengue fever is prevalent in tropical and subtropical regions around the globe.

Causes: - Dengue fever is caused by the dengue virus, which has four different serotypes.

↳ DENV-1

↳ DENV-2

↳ DENV-3

↳ DENV-4

When a mosquito bites a person already infected with dengue virus, it becomes a carrier and can transmit the virus into another person through its bite.

Symptoms: - Symptoms include

↳ High fever (104°F , 40°C)

↳ Severe headache, pain

↳ Fatigue, nausea, vomiting and mild bleeding

Treatment: - There is no specific antiviral treatment for dengue fever. Management focuses on relieving symptoms which include.

↳ Hydration (Drinking plenty of water)

↳ Pain Reliever medication

↳ Rest and medical care (IV fluids, supplements and blood transfusion).

Preventions:

↳ Use mosquito repellent.

↳ Wearing protective clothing.

↳ Use mosquito nets

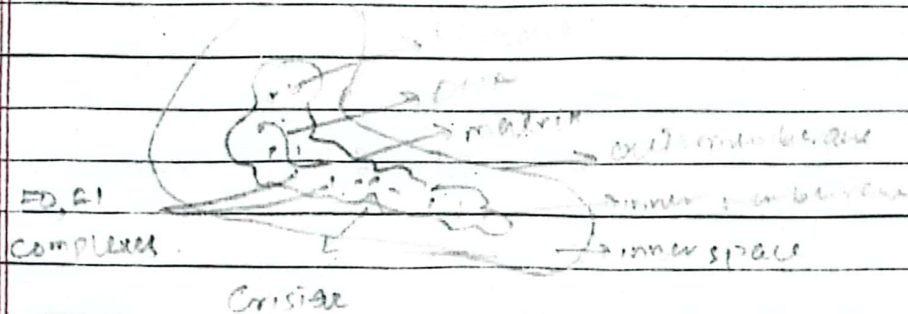
↳ Eliminate standing water

↳ Use insecticides and vaccines.

c) Discuss structure and function of mitochondria. How is it the powerhouse?

mitochondria - mitochondria is two membranous slippery like structure present in the cytoplasm of a cell. The two membranes one is inner membrane which form finger like folding towards inside called cristae. Inside mitochondria a liquid material is present which is called matrix. Chemically mitochondria is composed of lipids and proteins and a lot of enzymes present in the matrix along with coenzymes and inorganic salt which are used in the formation of ATP.

Functions: mitochondria is called powerhouse of the cell. because it gives energy to the cell to perform various functions. Activities like aerobic respiration and fatty acid metabolism takes place in mitochondria. mitochondria synthesise ATP, which is used to provide energy to the cell. mitochondria is composed of its own DNA called mitochondrial DNA which cannot be degraded in any situation and can provide various informations during investigation processes.



b) Explain dark matter and dark energy?

Dark matter: it is a substance that makes up a significant portion of the universe about 27%. it does not emit light or energy, which makes it invisible. We cannot see dark matter directly but scientists know it is there because of its gravitational effect on things we can see. like galaxies and stars.

some scientists think dark matter might be made up of particles that do not interact with light, making it very difficult from the matter we encounter every day.

Dark energy: it is a force that makes up about 68% of the universe and is believed to be driving the accelerated expansion of the universe. While we can see galaxies moving away from us, dark energy is thought to be the reason they are speeding up rather than slowing down. We cannot see dark energy directly but scientists infer its existence from observation of distant galaxies and the overall structure of the universe.

d) what are covalent bonds? Explain types along with structures.

Covalent bond: A covalent bond is formed by the sharing of electron between two joined atoms. This shared pair of electron is represented by a dash (-) between two bonded atoms. The shared pair of electron remains between the two bonded atoms and is called localized electron.

Types of covalent bond:

- ↳ single covalent bond
- ↳ Double covalent bond
- ↳ Triple covalent bond.

Single covalent bond: The bond in which two atoms share one electron each to form a pair of electron is called single covalent bond. A single straight line shows single covalent bond. Ex: H_2 , Cl_2 , F_2 etc.

Chlorine molecule is formed from two chlorine atoms. Electronic configuration of chlorine is 2, 8, 7. A chlorine atom has 7 electrons in its valence shell. The two atoms share one electron with each other to form chlorine molecule.



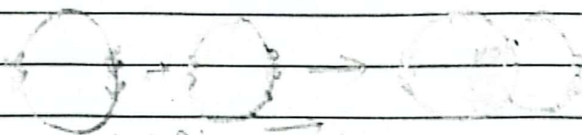
Double covalent bond: Covalent bond formed by sharing of two electrons. Denoted by double dash. ($=$)

Example is O_2 oxygen molecule is form from two oxygen atoms. The O_2 electronic configuration is 2,6 it has six electrons in valence shell and shares two electrons to form oxygen molecule.



Triple covalent bond: The bond in which two atoms share three electrons to form a molecule is called triple covalent bond. Denoted by triple dash. (\equiv).

Example is Nitrogen. The Electronic configuration of it is 2,5, it has 5 electrons in valence shell. It share 3 electron to form nitrogen molecule.



SECTION II

Q:6 a) Determine the 'k' value if the arithmetic mean of 9, 8, 10, k, 12 is 15.

$$\text{Arithmetic mean} = \frac{\text{sum of obs.}}{\text{total no of obs.}}$$

$$9 + 8 + 10 + k + 12 = 39 + k.$$

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

$$39 + k = 75, \quad k = 75 - 39 \Rightarrow 36.$$

Thus the value of k is 36.

b) A mixture contains sugar solution and coloured water in the ratio of 4:3. if 10 litres of coloured water is added to the mixture, the ratio becomes 4:5. Find the initial quantity of sugar solution in the given mixture.



Date: _____ Page: 8

M M M M M S

Sol: Let the initial ratio of sugar and coloured water is $4x$ and $3x$.

After 10 liters of water the new quantity of coloured water is $3x + 10$

According to equation

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

Cross multiplication

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

$$20x = 12x + 40$$

$$20x - 12x = 40$$

$$8x = 40$$

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

From the value of x we can find initial quantity of sugar

$$\Rightarrow 4x = 4 \times 5 = 20 \text{ litres}$$

Q) What will be the volume of a football of radius 12cm?

For the volume of football we can use the formula

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

Given the radius $r = 12$ put in formula.

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

$$\because 12^3 = 1728$$

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

$$\because \frac{4}{3} \times 1728 = \frac{6912}{3}$$

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

$$\Rightarrow 2304$$

$$V = 2304 \times 3.14 = 7238 \text{ cm}^3 \quad \because \pi \approx 3.14$$

Q) Given a series $-10, -8, 6, 40, 102, ?$ find what number would come in place of the question mark.

Q: 8: a)

Brain is a window cleaner. He uses the following formula to calculate the amount to charge his

customers charge = $\pounds 20 + 4n$ where n is the no. of windows a house. if a house had 7 windows, how much would he charge?

Sol: to calculate how much brain would charge per cleaning a house with 7 windows, we can use the formula provided.

$$\text{charge} = £20 + 4n.$$

$n \rightarrow$ number of windows. per this house $n = 7$.
putting "n" in the formula.

$$\text{charge} = £20 + 4(7)$$

$$\text{charge} = £20 + 28$$

Now add that to £20.

$$\text{charge} = £20 + £28 = \boxed{£48}$$

Therefore Brain would charge £48 per cleaning the house with 7 windows.

b) Find out the correct word from the given jumbled words.

① ~~carpile~~ carpile

② humanity

③ chacers

④ malonite

c) verify the A union B complement formula $(A \cup B)' = A' \cap B'$ for the sets $A = \{10, 11, 12, 13, 15\}$, $B = \{10, 12, 14\}$.

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

Sol: calculate $A \cup B$.

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

① calculate $\{A \cup B\}'$: $(A \cup B)'$ is the complement of $A \cup B$ in U

$$\begin{aligned} (A \cup B)' &= U - (A \cup B) = \{10, 11, 12, 13, 14, 15, 16, 18\} - \{10, 11, 12, 13, 14, 15\} \\ &= \{16, 18\}. \end{aligned}$$

② calculate A'

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

③ calculate B'

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

④ calculate $A' \cap B'$ $\Rightarrow \{14, 16, 18\} \cap \{11, 13, 15, 16, 18\} = \{16, 18\}$.

⑤ compare $(A \cup B)'$ and $A' \cap B'$

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

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

Since both results are equal, the formula is true for the given sets.