

Part-II (Section-I)

Question No. 02

- a. Global warming, which is a global threat, is hitting the developing and least developed world the most. What measure should be taken to counter it in COP-29?

Answer: - Global warming is a global threat:

Global warming is an international environmental problem. It is instigated by the human activities and perceived as a global threat. Global warming is hitting the both developed and developing countries. The Intergovernmental Panel on climate change (IPCC) defines global warming as the increase in average temperature of the Earth's surface air and oceans since the 19th century. This definition encapsulates both the historical trend of rising temperatures observed over the past century and the ongoing trend expected to continue into the future due to human-induced greenhouse gas emissions.

- Addressing Global warming at COP-29:

Addressing global warming at COP-29 should involve a combination of mitigation, adaptation, and support measures tailored to the specific needs of developing and least developed countries.

1- Financial Assistance

2- Technology Transfer

3- Capacity Building

4- climate Resilience

5- promote sustainable development

6- Partnerships and Collaborations

7- Empowerment and inclusivity

8- Education and Awareness

Fig. 01: Measures taken in COP-29 to counter Global Warming.

1- Financial Assistance: Developed countries should fulfill their commitment to provide financial support to developing nations for global warming mitigation and adaptation.

2- Technology Transfer: Developed countries should transfer the clean and sustainable technologies to developing countries at affordable rates to combat global warming.

3- Capacity Building: Developed countries should

provide technical assistance and capacity building support to help developing countries in implementing global warming mitigation and adaptation measures effectively.

4. **Promote Sustainable Development:** Both developed and developing countries should prioritize and encourage sustainable development pathways to reduce poverty, social inequality, and environmental problems (global warming).

5. **Climate Resilience:** Developed countries ^{should} support developing countries in building resilience to the impacts of climate change, such as sea-level rise, extreme weather events, and droughts.

6. **Partnerships and Collaboration:** Both developed and developing countries should foster partnerships between governments, civil society organizations, the private sector, and international institutions to mobilize resources and expertise for climate action. Moreover, collaboration at the global, regional and local levels is essential for achieving meaningful progress.

7. **Empowerment and Inclusivity:** Ensure that the voices and priorities of vulnerable communities, including indigenous peoples, women, and marginalized groups, are central to climate decision-making processes.

Date: _____

Day: _____

B. Education and Awareness: Promote climate literacy and awareness-raising campaigns to engage citizens, businesses, and policymakers in climate action.

By adopting a holistic approach that addresses the unique challenges faced by developing and least developed countries, COP-29 can contribute to global efforts to combat climate change and global warming and create a more sustainable and resilient future for all.

b. Describe the functions of arteries, veins and capillaries.

Answer: 1) Arteries: Definition - "Arteries are blood vessels that carry oxygenated blood away from the heart to various parts of the body."

- Function of Arteries:

- i- Transport oxygenated Blood: Arteries transport oxygen-rich blood from the heart to tissues and organs throughout the body.
- ii- Maintain Blood Pressure: Arteries have thick, elastic walls that help maintain blood pressure by expanding and contracting in response to the pumping action of heart.

ii - Distribute Nutrients: In addition to oxygen, arteries also transport nutrients and hormones to cells and tissues for metabolism and cellular function.

2- **Veins: Definition:** "Veins are blood vessels that carry deoxygenated blood from the tissues back to the heart."

- Function of Veins:

i - Return Deoxygenated Blood: Veins collect deoxygenated blood from the body's tissues and return it to the heart, where it is pumped to the lungs for oxygenation.

ii - Contain Valves: Veins have one-way valves that prevent the backward flow of blood and help facilitate the return of blood to the heart, especially against gravity in the lower extremities.

iii - Reservoir of Blood: Veins serve as a reservoir of blood that can be mobilized to maintain blood pressure and cardiac output during changes in posture or activity.

3- **Capillaries: Definition:** "Capillaries are tiny, thin-walled blood vessels that connect arteries and veins and facilitate the exchange of gases, nutrients, and waste products between blood and tissues."

- Function of capillaries:

- i - Gas and Nutrient Exchange: capillaries allow for the exchange of oxygen, carbon dioxide, nutrients, and waste products between the blood and surrounding tissues through their thin walls.
- Microcirculation: capillaries form an extensive network throughout the body, ensuring that every cell is close to a capillary for efficient exchange.
- Regulate Blood Flow: capillaries play a role in regulating blood flow to tissues and organs by dilating or constricting in response to local metabolic demands and hormonal signals.

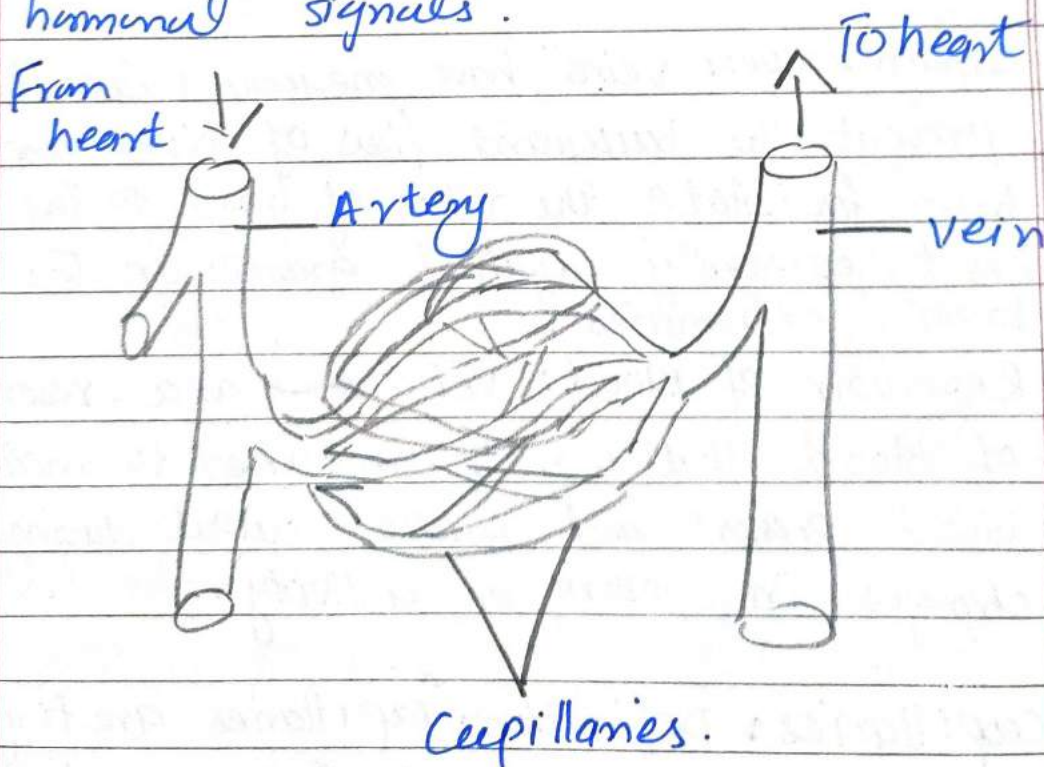


Figure 2: Structure diagram of vein, artery and capillaries.

Together, arteries, veins, and capillaries form the circulatory system, which is responsible for delivering oxygen and nutrients to cells, removing waste products and maintaining homeostasis throughout the body.

C- Why do atoms form chemical bonds?
Explain structure of water.

Answer: - Chemical bond:

Definition:

"A chemical bond is a force of attraction that holds atoms together in a molecule or compound. It arises from the interaction between the electrons of participating atoms."

- Reason behind Chemical Bonding:

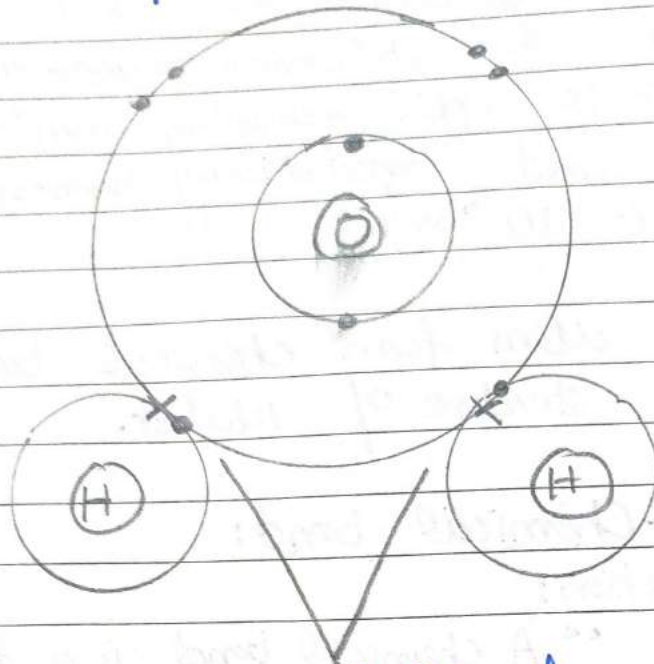
Atoms form chemical bonds to achieve a more stable configuration by filling their outermost electron shells. This stability is achieved through the sharing, donation or acceptance of electrons between atoms, resulting in the formation of molecules. Chemical bonds can be classified into three main types. a) Covalent bond b) Ionic Bond c) Hydrogen Bond.

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Date: _____

Day: _____

- Structure of Water Molecule (H_2O):



Oxygen (Z) = 8
Hydrogen (Z) = 1
Hydrogen (Z) = 1

Covalent bond

OR

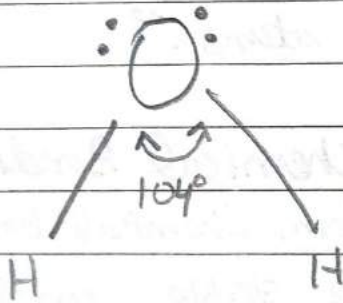


Figure 3: structure of water (H_2O).

Explanation: The structure of water (H_2O) is a bent or V-shaped. It consists of one oxygen atom (O) at the center and two hydrogen atoms (H) attached to the oxygen atom. The two hydrogen atoms are bonded to the oxygen atom, resulting in a molecule with a bent or angular shape.

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d) What are conductors, semi-conductors, metals, plastics and ceramics? Give an example of each.

Answer:

i) Conductors:

Definition: "Conductors are materials that allow the flow of electric current with little resistance."

Example: copper (Cu) is a commonly used conductor in electrical wiring due to its high conductivity and relatively low cost.

ii - Semi-conductors:

Definition: "Semi-conductors are materials that have electrical conductivity intermediate between that of conductors and insulators."

Example: silicon (Si) is the most widely used semiconductor in electronic devices such as transistors, and solar cells.

iii - Metals:

Definition: "Metals are a class of materials characterized by their lustrous appearance, high thermal and electrical conductivity and malleability."

Example: Iron (Fe) is a widely used metal in construction and engineering applications due to its strength, versatility and abundance.

4- Plastics:

Definition: "Plastics are synthetic polymers composed of long chains of repeating molecular units called monomers."

Example: Polyethylene (PE) is one of the most common types of plastics used in packaging.

5- Ceramics:

Definition: "Ceramics are inorganic, non-metallic materials that are typically composed of metallic and non-metallic elements bonded together by ionic or covalent bonds."

Example: Porcelain is a type of ceramic made from clay and other raw materials that is fired at high temperatures. It is widely used in production of tiles and insulators.

Question No. 03:

a. Answer: Impact of Technological Advancement on food production and quality:

Technological advancements in agriculture have indeed led to increased food production through practices such as mechanization, genetic modification, and the use of synthetic fertilizers and pesticides. While these advancements have helped fuel shortages and improve food security in many regions,

They have also raised concerns about the quality and sustainability of food produced. Here's a brief explanation of how technological advancements have impacted food quality.

- 1- **Loss of Nutritional Value:** Intensive agricultural practices focused on maximizing yield often prioritize quantity over quality. Monocropping, soil depletion and the use of high yield crops varieties lead to a decline in the nutritional content of food, including vitamins, minerals and phytochemicals.
- 2- **Chemical Residues:** The widespread use of synthetic fertilizers, pesticides and herbicides in modern agriculture can result in chemical residues remaining on food products which have adverse effects on human health.
- 3- **Genetic Modification:** While genetic modification (GM) of crops has the potential to increase crop yield, enhance nutritional content but concerns have been raised about the long-term health and environmental impacts of GM crops.
- 4- **Loss of Biodiversity:** Intensive farming practices can lead to the loss of biodiversity, including the genetic diversity

Date: _____

Day: _____

of crops and the destruction of natural habitats. Loss of biodiversity in agricultural systems can reduce resilience to pests, diseases and environmental stresses, ultimately compromising food security and ecosystem health.

5- Environmental Degradation: Modern agricultural practices, such as deforestation, irrigation and the use of chemical inputs can contribute to environmental degradation, including soil erosion, water pollution and green-house gas emissions. These environmental impacts reduce the quality of food.

Overall, technological advancements have undoubtedly increased food production but also raised important questions about the quality of food. Balancing food production along with quality is the significant challenge of 21st century.

6) Problems of solid waste Management:

Solid waste management faces a range of challenges that vary depending on factors such as population density, urbanization levels and socio-economic conditions. Some common problems facing solid waste management include:

- 1) **Inadequate Infrastructure:** Many regions lack sufficient infrastructure for collecting, transporting and disposing of solid waste.
- 2) **Population Growth and Urbanization:** Rapid population growth and urbanization exacerbate solid waste management challenges by increasing the volume of solid waste.
- 3) **Lack of Public Awareness:** Limited public awareness about waste management practices, including waste segregation, recycling and proper disposal.
- 4) **Improper Waste Disposal:** Improper waste disposal contribute to water and soil pollution.
- 5) **Waste Composition and Contamination:** The composition of waste varies, depending upon the economic activities which contaminate ^{drinking} water sources.

Date: _____

Day: _____

C. Answer:

- Dengue fever:

Definition: "Dengue fever is a mosquito-borne viral infection caused by the dengue virus, which is transmitted primarily by the *Aedes* mosquito species."

- Symptoms of Dengue Fever:

- i - High fever: Sudden onset of high fever, often reaching temperatures of 104°F (40°C)
- ii - Severe Headache: Intense headache, typically behind the eyes or in the temples.
- iii - Muscle and joint pain: severe muscle and joint pain, often described as "break bone fever."
- iv - Fatigue and weakness: profound fatigue, weakness and lethargy
- v - Nausea and Vomiting: Nausea, vomiting and loss of appetite, which can lead to dehydration.
- vi - Mild Bleeding: Individuals may experience mild bleeding manifestations, such as nose bleeds, etc.

- In context of Pakistan: In Pakistan, dengue fever is a significant public health concern, particularly during monsoon season when mosquito breeding increases. Efforts to control dengue fever in Pakistan include vector control measures, public awareness campaigns and manage cases effectively.

d. Answer:

- Plate Tectonics in the Tsunami:

Plate tectonics play a crucial role in the occurrence of tsunamis. When tectonic plates beneath the ocean floor shift suddenly due to seismic activity, such as an earth quake or volcanic eruptions, it can displace large volume of water, triggering tsunami.

For example: Subduction zones, where one tectonic plate is forced beneath another, are common sites for powerful earthquakes and subsequent tsunami.

- Richter Magnitude scale and Volcanic Explosivity Index:

The Richter magnitude scale and Volcanic explosivity Index both are used to measure the intensity of geological events, but they applied to different phenomena.

- The Richter magnitude scale quantifies the energy released by earthquakes based on the amplitude of seismic waves recorded by seismographs. It is a logarithmic scale, meaning that each whole number increase on the scale represents a tenfold increase in the amplitude of seismic waves and approximately 31.6 times more energy released. It is primarily used for measuring the magnitude of earthquakes.

Date: _____

Day: _____

- The volcanic explosivity index is used to measure the intensity of volcanic eruptions based on factors such as the volume of erupted material, eruption cloud height and duration of eruption. The VEI is a logarithmic scale range from 0 to 8, with each whole number increase representing a tenfold increase in the volume of erupted material and energy released.

In summary, the Richter magnitude scale quantifies the energy released by earthquakes, the volcanic explosivity index assesses the explosiveness and intensity of volcanic eruption. Both scales provide valuable information of geological events on earth's surface and human population.

Section - II:

Q. 06

a) Solution :

First find the total increase in population over the decade:

$$\text{Total increase} = 22,500 - 18,000 = 4,500$$

Next, Average Annual growth rate =

$$\frac{\text{Total increase}}{\text{No. of years}} \quad \text{--- (1)} \quad \begin{array}{l} 40600 \\ \times \\ 45000 \end{array}$$

$$\text{No. of years} = 10$$

put in the formula (1)

$$\text{Average Annual growth rate} = \frac{4500}{10} = \boxed{450}$$

Now, expressing in %

$$\% \text{ increase per year} = \left(\frac{\text{Average annual growth rate}}{\text{initial population}} \right) \times 100$$

$$= \left(\frac{450}{18,000} \right) \times 100$$

$$\% \text{ increase per year} = \boxed{2.5\%}$$

So, the population of the village increased by approximately 2.5% per year on average over the decade.

Date: Solution:

Day:

b) First, Let's find out how many units one machine can make in a day.

Units made by one machine in

$$1 \text{ day} = \frac{600}{20 \times 9} = \frac{600}{180} = \boxed{3.33}$$

- Now, units made by 18 machines in 12 days:

$$= 18 \times 3.33 \times 12$$

units made by 18 machines in 12 days $\boxed{239.78}$

c) Solution:

1 kilometer = 1000 meters.

So, 69 kilometers is equal to

$$69 \text{ km} \times 1000 = 69,000 \text{ meters}$$

Now, that both distances are in meters, we can calculate the ratio of their speeds.

$$\text{speed of the car} = \frac{450}{1} = 450 \text{ meters per minute}$$

$$\text{speed of the train} = \frac{69000}{45} = 1533.33 \text{ meters per minute}$$

$$\text{Now, the ratio of their speeds} = \frac{\text{speed of car}}{\text{speed of train}}$$

$$= \frac{450}{1533.33}$$

$$\text{Ratio of speeds} \approx 0.2937$$

So, the ratio of the car's speed to the train speed is approximately 0.2937.

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Date: _____

Day: _____

d) Solution .

Since a regular pentagon has five equal sides .

$$\begin{aligned} \text{Perimeter} &= 5 \times \text{length of one side} \\ &= 5 \times 15 \text{ cm} \end{aligned}$$

$$\boxed{\text{Perimeter} = 75 \text{ cm}}$$

Therefore, the Perimeter of the Pentagon is 75 cm.

Q.07:

a. I.Q: ^{ee}I.Q or Intelligence Quotient, is a measure of an individual cognitive abilities relative to others in a population. IQ scores are standardized to have a mean of 100 and a standard deviation of 15 with

Factors which Affects I.Q: a score falling within normal distribution.

- i- Genetics: Genetic factor play a significant role in determining I.Q. with estimates suggesting that genetic factors account for approximately 50-85% of individual differences in IQ.
- ii- Environmental factors: Environmental factors such as socio-economic conditions, family environment, have a significant impact on I.Q.
- iii- Early childhood Experiences: parental care, maternal health have a lasting impact on I.Q levels of an individual.
- iv- Education: Education and learning opportunities have lasting impact on I.Q level.
- v- Health: Nutrition and health have significant impact on an individual I.Q development.

Date: _____

b) Solution.

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

if $r = 4 \text{ cm}$ then

$$\text{Circumference} = 2 \times \pi \times 4$$

$$\text{Circumference} = 8\pi$$

$$\pi = 3.14$$

$$\text{So Circumference} = 8 \times 3.14$$

$$\text{Circumference} = 25.12 \text{ cm}$$

So, the circumference of a circle is 25.12 cm.

$$\text{c) 1) Mean} = \frac{\text{Sum of all ages}}{\text{No. of students}} = \frac{20+22+21+21+23}{5}$$

$$= \frac{107}{5} = \boxed{21.4}$$

2) Median: first arrange in ascending order
20, 21, 21, 22, 23.

Median is $\boxed{21}$ in this case.

3) Mode: Mode is the value that appears most frequently.

So, the mode is 21 age in this case.

$$\text{4) Range} = \text{Highest age} - \text{Lowest age}$$

$$= 23 - 20$$

$$\boxed{\text{Range} = 3}$$

So, the mean age is 21.4, median age is

21, mode age is 21 and the range is 3.

Date: _____

Day: _____

(d) Solution :

- Tehir invested Rs. 15000 for entire year (12 months).

- Umar joined after 5 months, so his investment active for 7 months.

- Usman joined at the start of 9th month, so his investment active for 4 months.

$$\text{Tehir share} = \frac{15000 \times 12}{15000 + 30000 + 18000} \times 406000$$

$$\text{Tehir share} = \frac{15000}{90000} \times 406000$$

$$= \boxed{67666.67}$$

$$\text{Umar's share} = \frac{30000 \times 7}{90000 \times 12} \times 406000$$

$$= \boxed{79111.11}$$

$$\text{Usman share} = \frac{18000 \times 4}{108000} \times 406000$$

$$= \boxed{67555.56}$$

So, Tehir share is 67666.67, Umar's share is 79111.11, Usman share is 67555.56.