

Q.No.3:

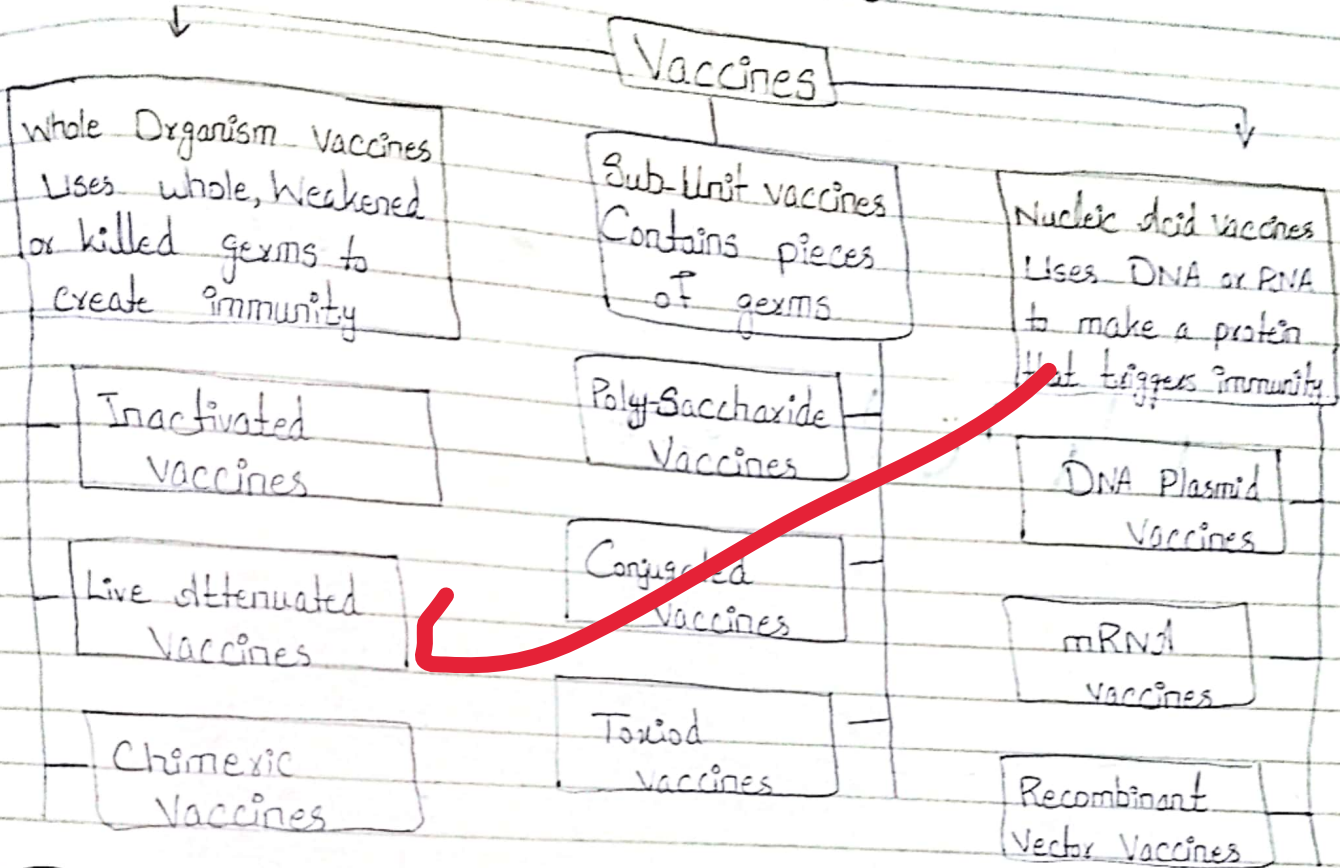
a: what are vaccines? Classify these and discuss DNA vaccines in detail?

Definition: Vaccines are the suspension of microorganisms that help the immune system recognize and fight diseases by introducing a harmless part of a germ.

Examples :

Polio vaccines ⇒ Covid-19 vaccines etc

Classification of Vaccines:



DNA Vaccine: DNA vaccines are the types of nucleic acid vaccines. In DNA vaccines uses a small piece of genetically engineered DNA-plasmid to teach cells to make a germ protein, which triggers an immune response.

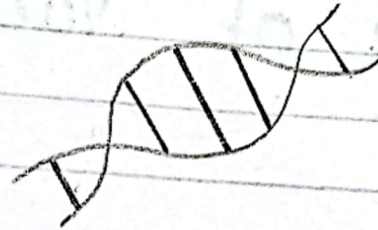
Examples:

- ⇒ INOVIO's DNA Vaccine for COVID-19
- ⇒ H5N1 avian influenza
- ⇒ H1N1 pandemic "

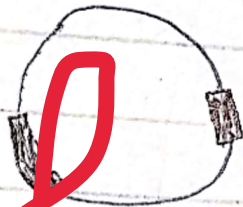
Formation and Working of DNA Vaccine:

- ① Choose the specific part of the germ (antigen) that will be used in the vaccine.
- ② Isolate the DNA with the antigen.
- ③ Put the antigen DNA into a plasmid.
- ④ Multiply the plasmid using bacteria.
- ⑤ Clean the plasmid DNA from bacteria.
- ⑥ Purified plasmid DNA becomes the vaccine.

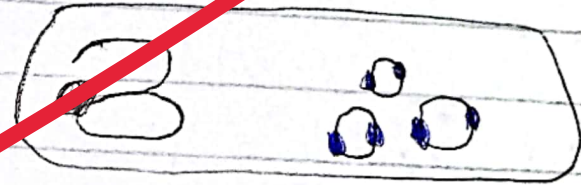
Step 1



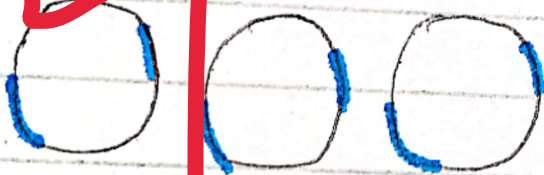
Step 2



Step #3



step 4



Step 5



Step 6



Part B What are causative organism and vector for dengue, enlist possible ways of prevention from dengue?

Def of Dengue: Dengue is a viral infection that leads to high fever, severe headache, joint & muscle pain, rash, & sometimes bleeding. It is spread through the bite of infected mosquitoes called dengue virus (DENV).

Causative Agents: The virus causing dengue fever belongs to the Flaviviridae family. There are four distinct dengue viruses (DENV-1, DENV-2, DENV-3, DENV-4) without cross-immunity.

Vector for Dengue: They are the primary agents that are responsible for the spreading of disease. The primary vector that is responsible for the dengue virus is known as Aedes aegypti mosquitoes and, to a lesser extent, Ae. albopictus.

Prevention & Controls

- ① Sleep under nets to avoid bites, especially in dengue-prone areas.
- ② Wear long sleeves shirt, pants & socks to cover your skin & reduce the chance of mosquito bites.
- ③ Empty & clean containers like buckets etc to stop mosquitoes from breeding.
- ④ Use window & door screens to keep mosquitoes out.
- ⑤ Remove trash & clutter where mosquitos can hide or breed.
- ⑥ Support local mosquito control efforts like fogging & spraying.
- ⑦ Inform family & friends about dengue prevention.

Q.No.5: @ What do you know about Remote sensing Techniques? Explain resolution and write down the names of its various types?

Remote Sensing Techniques: Remote sensing involves collecting ~~data~~ information about the Earth's surface without being in direct contact with it. This is done using sensors on satellites, airplanes or drones, which capture data in the form of images or other measurements. These techniques are used in various fields like weather forecasting, environmental monitoring, and mapping.

Advantages of Remote Sensing Technique:

- ⇒ It is used to gather details about the Earth and other solar planets.
- ⇒ Tracking and analysis of clouds can be done through remote sensing.
- ⇒ Allows monitoring of hard-to-reach or dangerous locations.
- ⇒ Provide up-to-date information for timely decision-making.
- ⇒ Useful in agriculture, disaster management and more.
- ⇒ Reduces the need for extensive ground surveys, saving time and money.

Resolution:

Resolution explains how data can be used from a sensor. It can vary depending on the sensor design and the satellite's orbit. There are four main types of resolution:

1 : **Spatial Resolution**: The size of the area on the ground that each pixel represents. For example, a satellite image with a spatial resolution of 10 meters means each pixel covers a 10-meter by 10-meter area on the ground.

2 : **Spectral Resolution**: The ability to detect different wavelengths of light. Higher spectral resolution means the sensor can detect more specific wavelengths.

3 : **Temporal Resolution**: It describes how often a sensor captures data of the same area. Higher temporal resolution means the area is observed more frequently.

4 : **Radiometric Resolution**: The sensor's ability to detect slight differences in energy levels. Higher radiometric resolution means the sensor can detect more subtle changes in the image.

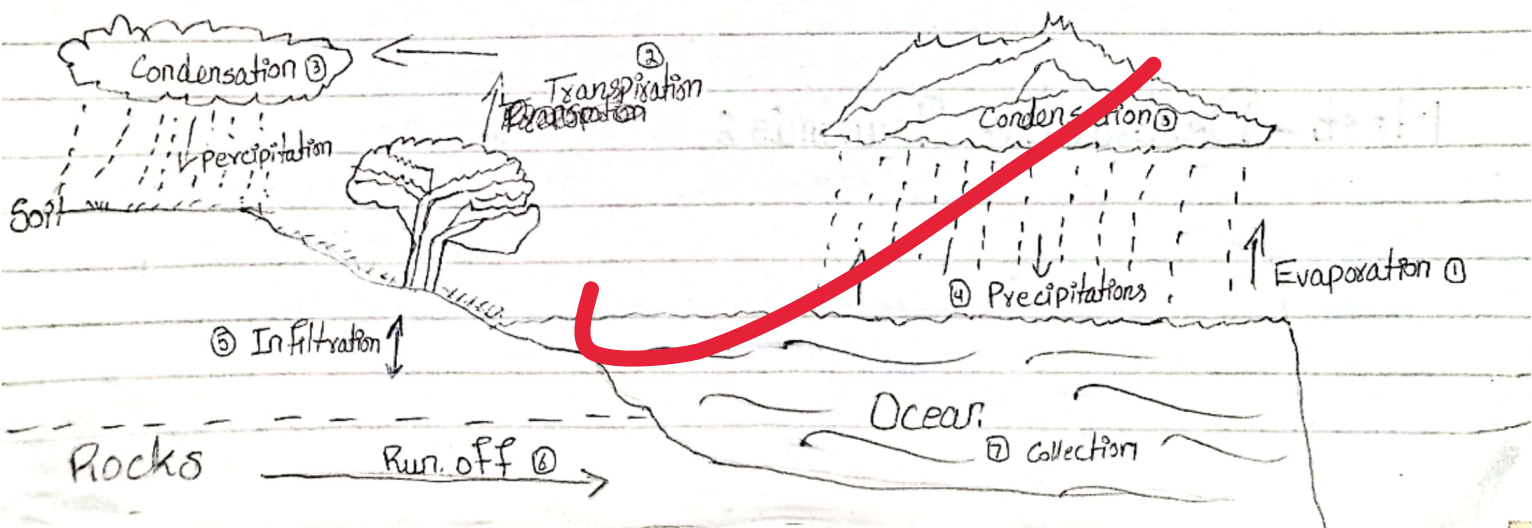
⇒ These resolutions are key factors in determining the quality and usefulness of remote sensing data for different applications.

Q. No. 5. (b) What is hydrological cycle? Discuss its importance?

Hydrological Cycle: The hydrological cycle also known as water cycle, is the continuous water circulation in the Earth's Atmosphere system. The water cycle is the water's motion from the ground to the atmosphere and back again in the form of rain or snow. Hence, the reason behind the rain or snow etc, can be understood by studying the water cycle or hydrological cycle.

Steps involved in the hydrological cycle:

1. **Evaporation:** Water from oceans, lakes, and rivers heats up, turns into vapor, and rises into the air.
2. **Transpiration:** Plants release water vapor from their leaves into the atmosphere.
3. **Condensation:** The water vapor cools down and changes into tiny droplets, forming clouds.
4. **Precipitation:** The water droplets in clouds combine and fall back to earth as rain, snow etc.
5. **Infiltration:** Some of the water soaks into the ground, replenishing ground water supplies.
6. **Run off:** Water that doesn't soak into the ground flows over the land, eventually reaching rivers, lakes, and oceans.
7. **Collection:** Water collects in bodies of water like rivers, lakes and oceans, and the cycle starts again.



Importance of the Hydrological Cycle

The hydrological cycle is essential for life on Earth because:

- 1. Water Supply:** It provides fresh water for drinking, farming, and daily activities.
- 2. Climate Control:** The cycle helps control the Earth's climate by balancing heat and moisture across the planet.
- 3. Ecosystem Health:** It delivers water to plants and animals, keeping ecosystems thriving.
- 4. Soil Moisture:** The cycle helps keep soil wet, which is necessary for growing crops.

Summary: In summary, the hydrological cycle plays a key role in supporting life, regulating the climate, and ensuring the availability of fresh water.

Q. No. 6: (a) What is tsunami? How are tsunamis generated and what are their characteristics?

What is a Tsunami?

A tsunami is a series of ~~waves~~ large ocean waves caused by sudden movements on the ocean floor. These waves travel across the ocean at high speeds and can cause massive destruction when they reach coastal areas.

Most Destructive Tsunamis:

- ① 2004 Indian Ocean Tsunami triggered by a magnitude 9.1-9.3 earthquake.
- ② 2011 Japan North Pacific coast and a magnitude 9.0 earthquake.

Most Recent Tsunami: The most recent tsunami occurred on August 19, 2023, in the region near the Kermadec Islands, with a magnitude of 8.1.

How Tsunami are Generated:

Tsunami are usually caused by the following events:

1: Earthquakes: The most common cause, especially when an underwater earthquake displaces a large amount of water.

2: Volcanic Eruptions: Underwater or coastal volcanoes can cause the ocean floor to move, displacing water and creating waves.

3: Landslides: When a large volume of rock falls into the ocean, it can push water and generate a tsunami.

4: Meteorite Impacts: Though rare, a large meteorite hitting the ocean can cause a tsunami by displacing water.

5: Glacier Calvings: When large chunks of ice break off glaciers and fall into the sea, they can create waves that may develop into tsunamis.

Characteristics of Tsunamis:

⇒ Tsunamis can travel across the ocean at speeds of up to 800 km/h.

⇒ Tsunamis have very long wavelengths, often over 100 km between wave crests.

⇒ In the deep ocean, tsunamis may only be a few feet high, making them hard to detect.

⇒ A tsunami is not just one wave but a series of waves.

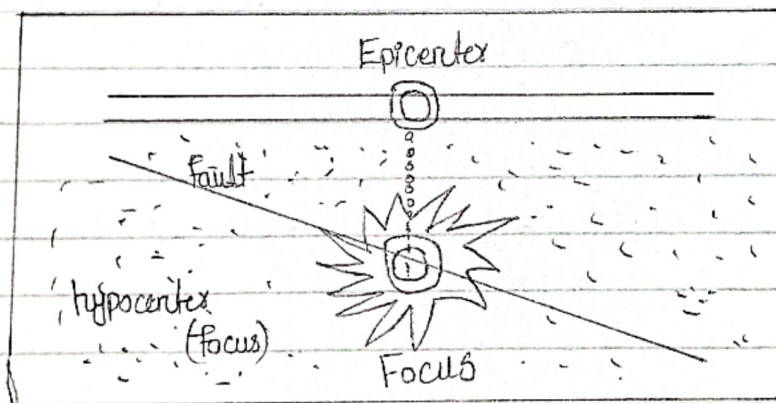
⇒ Tsunami waves can continue for hours, making the situation dangerous long after the first wave hits.

In conclusion, tsunamis are powerful and destructive natural disasters that can cause widespread damage to coastal areas. Understanding their causes and characteristics is crucial for preparedness and response efforts.

Q.No.6 Part B: What is an earthquake? Discuss Richter Scale in the context. What was the intensity of earthquake in Japan in August 2024 and where was the locus?

Earthquake: An earthquake is a sudden shaking of the ground caused by the movement of tectonic plates beneath the Earth's surface. This movement release energy in the form of seismic waves, which can cause damage to buildings, roads and other structures.

- ⇒ The surface where the earth slips are called **Fault / Focus**
- ⇒ The surface where the earthquake starts is known as the **Hypocenter**.
- ⇒ The surface directly above the hypocenter is called an **Epicenter**.



Richter Scale: The Richter scale measure the strength or magnitude of an earthquake. It is a numerical scale, where each whole number increase represent a tenfold increase in measured amplitude and roughly 31.6 times more energy release. For example a magnitude 5 earthquake is 10 times stronger than a magnitude 4 and release over 31 times more energy. This scale helps scientists and emergency responders understand the earthquake's size and impact.

Magnitude of Richter Scale	Description	Effects of the Earthquakes	Frequency
Less than 2.0	Micro	Earthquake not felt	Approximately 8000 per day
3.0 to 3.9	Minor	Not felt	Approximately 1000 per day year
4.0 to 4.9	Light	Earthquake felt	" 6200 per year
6.0 to 6.9	Strong	Very destructive	" 120 per year
8.0 to 8.9	Great	Cause serious damages	" 1 per year
10.0 +	Epic	Never been recorded	Cannot be estimated

Intensity and locus of the earthquake happened on August 2024 :

a : Intensity : ~~The earthquake~~

According to Japan Meteorological Agency (JMA), the earthquake had a magnitude of 7.1 on the Richter Scale. The intensity is affected areas varied but typically caused moderate to significant shaking and damage.

b : Locus : The epicenter was located in the Tohoku region of Japan.

Good answers!!!