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TODAY'S IMPORTANT CURRENT AFFAIRS

UPSC PRELIMS

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TODAY'S DROPS OF NEWS:

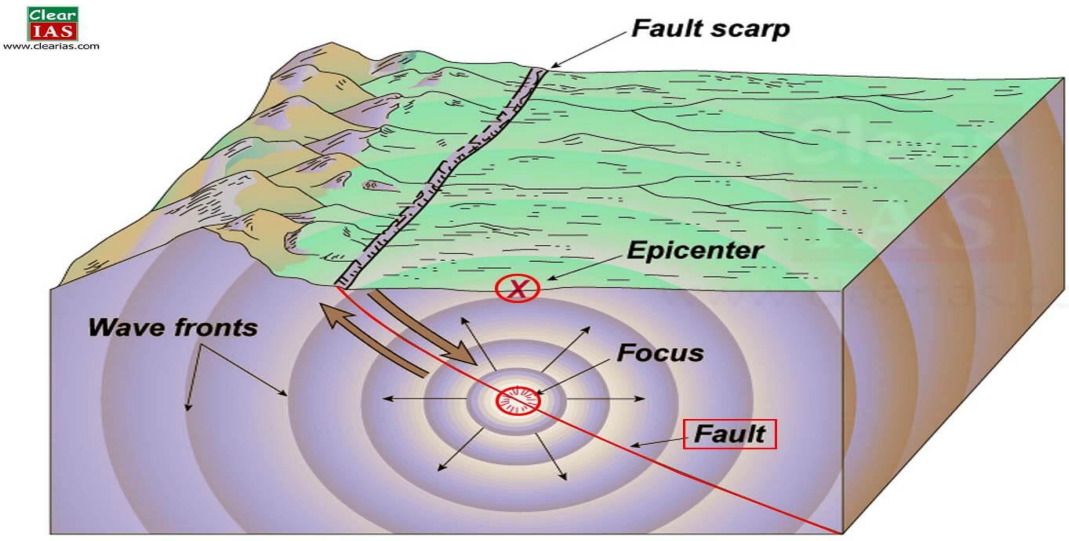
SUBJECT	IN NEWS
POLITY	---
ECONOMY	---
GEOGRAPHY	Russia earthquake triggers tsunami waves in Japan, U.S.
HISTORY AND ART & CULTURE	---
ENVIRONMENT	---
SCIENCE & TECH	---
MISCELLANEOUS	---

GEOGRAPHY

In news: Russia earthquake triggers tsunami waves in Japan, U.S.

Earthquake: An earthquake is shaking or trembling of the earth's surface, caused by the seismic waves or earthquake waves that are generated due to a sudden movement (sudden release of energy) in the earth's crust (shallow-focus earthquakes) or upper mantle (some shallow-focus and all intermediate and deep-focus earthquakes).

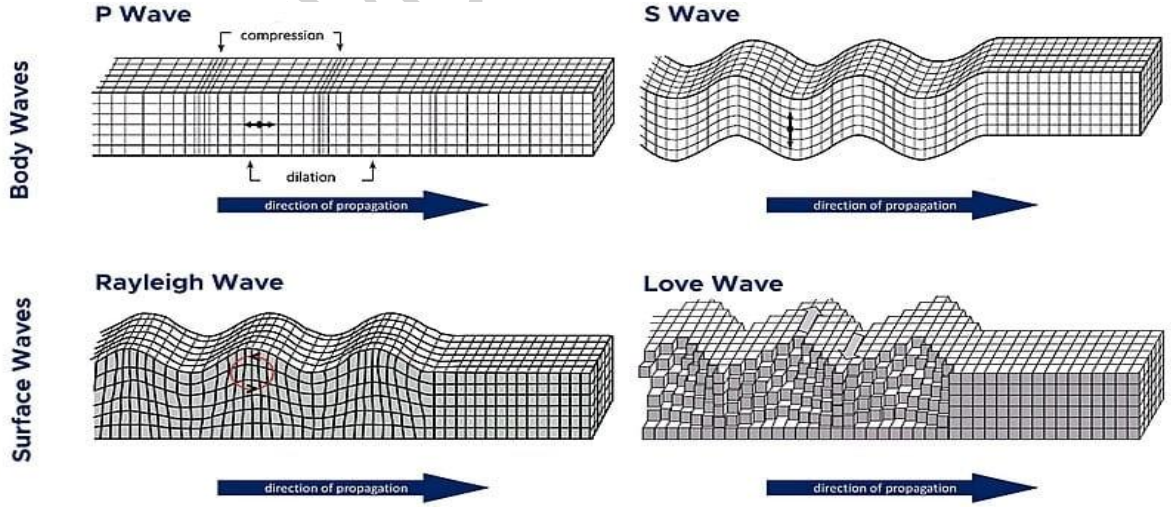
- The vibrations called seismic waves are generated from earthquakes that travel through the Earth and are recorded on instruments called seismographs.
- The location below the earth's surface where the earthquake starts is called the **hypocenter,** and the location directly above it on the surface of the earth is called the **epicenter.**



Swarms: Large numbers of small earthquakes may occur in a region for months without a major earthquake.Such series of earthquakes are called earthquake swarms.

Types of earthquake waves:

- Earthquake waves are of two types — body waves and surface waves.



Body waves: There are two types of body waves. They are p-waves (primary-waves) and s-waves (secondary-waves).

P- Waves:

- P-waves are also known as the Primary waves. They are the first waves to arrive at the surface.
- The characteristics of P-waves are like sound waves. They travel through all three mediums- solid, liquid, and gas.
- These waves tend to vibrate parallel to the direction of wave propagation. This causes density differences in the material through which they travel.
- These waves are responsible for elongating and squeezing material.

S- Waves:

- S- Waves arrive sometime after the happening of the Earthquake and they are called secondary waves.
- A significant characteristic of these S-waves is that they travel only through a solid medium.
- The direction of vibration of this S-wave is perpendicular to the direction of wave propagation, thereby creating crests and troughs in the material of their transmission.

Surface waves: There are two types of surface waves. They are love-wave and Rayleigh wave.

Rayleigh Waves:

1. British physicist Lord Rayleigh demonstrated the Rayleigh Waves mathematically.
2. A Rayleigh wave is a seismic surface wave producing the sudden shake in an elliptical motion, with no crosswise or perpendicular motion.
3. It moves along the ground just like a wave moves across a lake or an ocean.
4. The greater part of the shaking felt from an earthquake is because of the Rayleigh wave, which can be considerably bigger than other waves.
5. Because it rolls, it moves the ground up and down and side-to-side in the same direction that the wave is moving.

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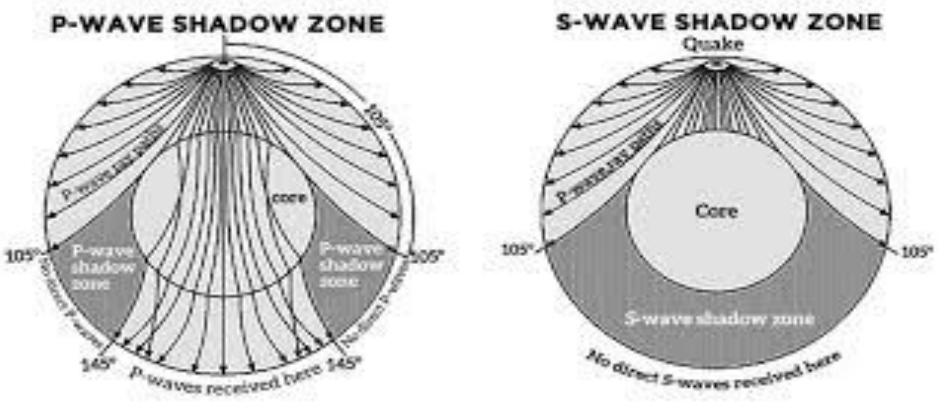
Love Waves:

1. Much slower than Body Waves but are the fastest surface wave and moves the ground from side to side.
2. Love wave is also a seismic surface wave led to the horizontal shifting of the earth during an earthquake.
3. Confined to the surface of the crust Love waves always produce entirely horizontal motion.
4. They exist only in the presence of a semi-infinite medium overlain by an upper finite thickness.

Shadow Zone:

- The shadow zone is the zone of the earth from angular distances of 104 to 140 degrees from a given earthquake that does not receive any direct P waves.
- The shadow zone results from P waves being refracted by the liquid core and S waves being stopped completely by the liquid core.
- A zone between 105° and 145° from the epicentre was recognized as the shadow zone for both the wave types.
- The entire zone beyond 105° does not receive S-waves.
- The shadow zone of the S-wave is larger than that of the P-waves.
- The shadow zone of P-waves appears as a band around the earth between 105° and 145° away from the epicentre.



Causes of Earthquake:

- Fault Zones
- Plate tectonics

- Volcanic activity
- Human Induced Earthquakes

Types of Earthquake :

Based on the depth of focus:

- The earthquakes are divided into three zones: shallow, intermediate, and deep based on their depth which range between 0 – 700 km.
  - **Shallow earthquakes** have a focus 0 – 70 km deep.
  - **Intermediate earthquakes** have a focus 70 – 300 km deep.
  - **Deep earthquakes** have a focus 300 – 700 km deep.

Based on the depth of magnitude:

1) Minor **(Magnitude 2.5-5.4):** Often felt by people, but typically cause only minor damage to buildings.

2) Moderate **(Magnitude 5.5-6.0):** Can cause slight damage to poorly constructed buildings and other structures.

3) Strong **(Magnitude 6.1-6.9):** Can cause considerable damage in populated areas.

4) Major **(Magnitude 7.0-7.9):** Causes serious damage over large areas and can be devastating.

5) Great **(Magnitude 8.0 and higher):** Can cause widespread destruction and loss of life.

Wadati–Benioff zone

- Deep earthquakes (300-700 km) are produced in this zone.
- It is a zone of subduction, along which earthquakes are common, which are produced by the interaction of a downgoing oceanic crustal plate against a continental plate.
- Some of the most powerful earthquakes occur along this zone.

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- These earthquakes can be produced by slip along the subduction thrust fault or by slip on faults within the downgoing plate as the plate is pulled into the mantle.

Distribution of Earthquakes:

- circum-Pacific seismic belt
- Alpide earthquake belt (mid Continental belt)
- mid-Atlantic Ridge

Measurement of Earthquakes

- The energy from an earthquake travels through Earth in vibrations called **seismic waves.**
- Scientists can measure these seismic waves on instruments called **seismometers.**
- A seismometer detects seismic waves below the instrument and records them as a series of zig-zags.
- Scientists can determine the time, location and intensity of an earthquake from the information recorded by a seismometer. This record also provides information about the rocks the seismic waves traveled through.
- The earthquake events are scaled either according to the magnitude or intensity of the shock. The magnitude scale is known as the **Richter scale.** The magnitude relates to the energy released during the quake. The magnitude is expressed in absolute numbers, 0-10.
- The intensity scale is named after **Mercalli,** an Italian seismologist. The intensity scale takes into account the visible damage caused by the event. The range of intensity scale is from 1-12.

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Effects of Earthquake

- Earthquakes are a natural hazard. If a tremor of high magnitude takes place, it can cause heavy damage to the life and property of people. The following are the immediate hazardous effects of earthquake:
  - Ground Shaking
  - Differential ground settlement
  - Land and mudslides
  - Fires
  - Ground lurching
  - Avalanches
  - Ground displacement
  - Floods from dam and levee failures
  - Structural collapse
  - Tsunami

Earthquake in India

- India is one of the highly earthquake affected countries because of the presence of technically active young fold mountains - Himalaya.
- India has been divided into **four seismic zones (II, III, IV, and V)** based on scientific inputs relating to seismicity, earthquakes occurred in the past and tectonic setup of the region.

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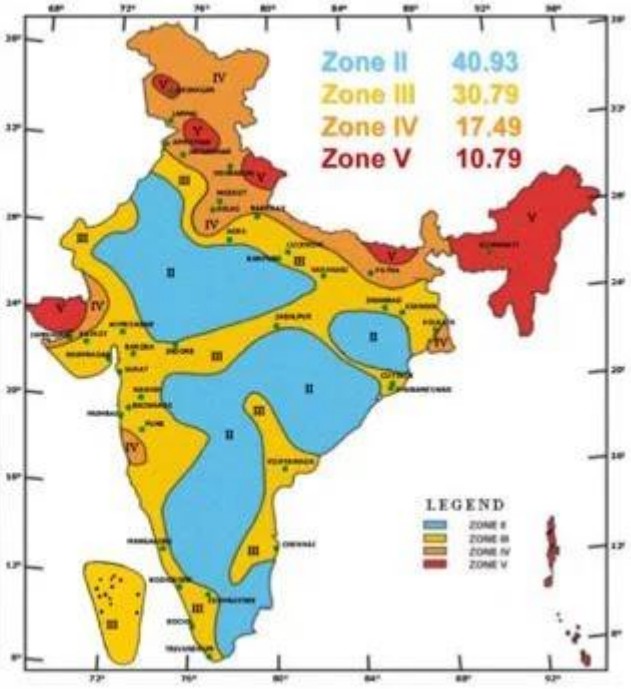
Seismic Zone Map of India: -2002

About 59 percent of the land area of India is liable to seismic hazard damage

Zone	Intensity
Zone V	Very High Risk Zone Area liable to shaking Intensity IX (and above)
Zone IV	High Risk Zone Intensity VIII
Zone III	Moderate Risk Zone Intensity VII
Zone II	Low Risk Zone VI (and lower)



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