SCIENCE

EARTHQUAKES

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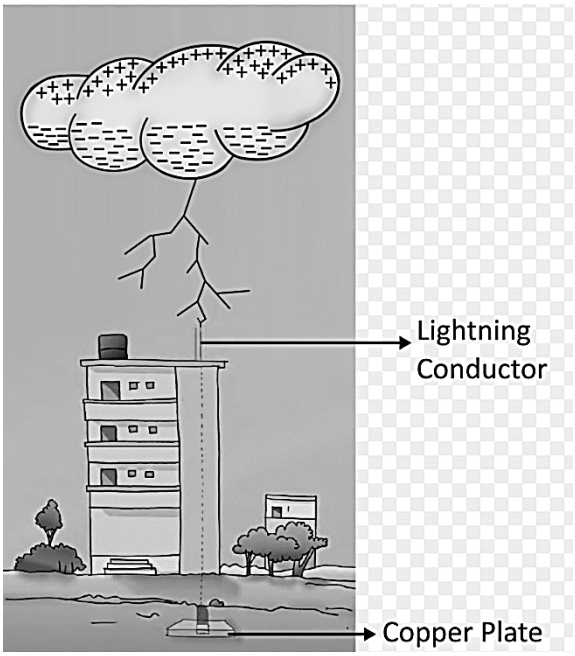
These natural phenomena can cause large scale destruction of human life and property. Fortunately, these phenomena can be predicted to some extent. The weather department can warn about a thunderstorm developing in some area.

If a thunderstorm occurs there is always a possibility of lightning and cyclones accompanying it. So, we get time to take measures to protect ourselves from the damage caused by these phenomena.



Lightning conductor

There is, however, one natural phenomenon which we are not yet able to predict accurately. It is an earthquake. It can cause damage to human life and property on a huge scale. A major earthquake occurred in India on 8 October 2005 in Uri and Tangdhar towns of North Kashmir. Before that a major earthquake occurred on 26 January 2001 in Bhuj district of Gujarat.

What is an earthquake? What happens when it occurs? What can we do to minimise its effects? These are some of the questions which we shall discuss below.

What is an Earthquake?

An earthquake is a sudden shaking or trembling of the earth which lasts for a very short time. It is caused by a disturbance deep inside the earth's

Fig. Kashmir earthquake

crust. Earthquakes occur all the time, all over the earth. They are not even noticed. Major earthquakes are much less frequent. They can cause immense damage to buildings, bridges, dams and people. There can be a great loss to life and property. Earthquakes can cause floods, landslides and tsunamis. A major tsunami occurred in the Indian Ocean on 26 December 2004. All the coastal areas around the ocean suffered huge losses.

CAUSES AN EARTHQUAKE

Earthquakes are caused due to sudden tectonic movements in the earth's crust. When the tectonic plates slide over one another, there is a cause of orogeny which results in earthquakes and volcanoes. These disturbances cause vibrations that spread in all directions. As there is a relative motion of these plates, there is stress built up, which breaks by releasing the stored energy known as shock waves.

PROTECTION AGAINST EARTHQUAKES

Precautions that should be taken during the earthquake are -

1. Stay calm! If you're indoors, stay inside. If you're outside, stay outside.

2. If you're indoors, stand against a wall near the center of the building, stand in a doorway, or crawl under heavy furniture (a desk or table). Stay away from windows and outside doors.
3. Stay away from tall and heavy objects that may fall on you.
4. If you are in bed, do not get up. Protect your head with a pillow.
5. If you're outdoors, stay in the open away from power lines or anything that might fall. Stay away from buildings (stuff might fall off the building or the building could fall on you).
6. Don't use matches, candles, or any flame. Broken gas lines and fire don't mix.
7. If you're in a car, stop the car and stay inside the car until the earthquake stops.
8. Don't use elevators (they'll probably get stuck anyway).

SEISMOGRAPH

A seismograph is an instrument that measures and documents vital information about earthquakes. Seismographs are equipped with electromagnetic sensors that translate ground motions into electrical voltages.

A seismograph aids scientists in detecting earthquakes and measuring several aspects of the event, such as:

- The time at which the earthquake occurred.
- The epicentre is the location on the surface of the Earth below which the earthquake occurred.
- The depth below the Earth’s surface at which the earthquake occurred.
- The amount of energy released by the quake.

The working principle of Seismograph is relatively simple.

A basic Seismograph consists of a solid base and a heavyweight suspended from a spring over the base. A pen hangs from the weight, and a rotating drum with paper sits below it on the base. The tip of the pen touches the drum. When the earth shakes from an earthquake, the drum rotates, and the weighted pen moves back and forth due to the motion of seismic waves. The pen records the movement on the drum. The paper recording of an earthquake is called a seismogram.

A seismograph is securely mounted onto the surface of the earth. Except for the mass on the spring, the entire unit shakes when the earth shakes. The heavyweight mass remains in the same place due to its inertia. The recording device on the mass records the relative motion between itself and the rest of the instrument as the seismograph shakes under the mass, thus recording the ground motion. In reality, these mechanisms are no longer manual but instead work by measuring electronic changes produced by the ground's motion with respect to the mass.

The most high-tech seismographs used by scientists studying earthquakes today are sophisticated and precise. They are based on the same concept as a basic, simple seismograph but use electronics, magnets, and amplifiers to accurately and precisely measure the tiniest ripples in the earth caused by earthquakes.