Chapter - 3
Interior of the Earth

1. Multiple choice questions.

(i) Which one of the following earthquake waves is more destructive?
(a) P-waves
(b) S-waves
(c) Surface waves
(d) None of the above
Answer:
(c) Surface waves

(ii) Which one of the following is a direct source of information about the interior of the earth?
(a) Earthquake waves
(b) Volcanoes
(c) Gravitational force
(d) Earth magnetism
Answer:
(a) Earthquake waves
Explanation- Earthquake waves are felt and can be recorded and analyzed by studying different types of earthquake waves. Hence, it becomes the direct source of information about the interior of the earth. Earthquake Waves are of two types; Body waves and Surface waves.

(iii) Which type of volcanic eruptions have caused Deccan Trap formations?
(a) Shield

(b) Flood

(c) Composite

(d) Caldera

Answer:

(b) Flood

(iv) Which one of the following describes the lithosphere:

(a) upper and lower mantle

(b) crust and upper mantle

(c) crust and core

(d) mantle and core

Answer:

(b) crust and upper mantle

2. Answer the following questions in about 30 words.

(i) What are body waves?

Answer

Body waves are earthquake waves which are generated due to the release of energy at the focus and move in all directions travelling through the body of the earth.

(ii) Name the direct sources of information about the interior of the earth.

Answer

The direct sources of information about the interior of the earth are:

• Mining: It is the process of extracting valuable minerals from the earth. Surface rock or the rocks we get from mining areas provide most easily available solid earth material.

• Drilling: Scientists are working on two major projects such as “Deep Ocean Drilling Project” and “Integrated Ocean Drilling Project”. This and many deep drilling projects have provided large volume of information through the analysis of materials collected at different depths.

• Volcanic eruption: It forms another source of obtaining direct information. As and when the
molten material (magma) is thrown onto the surface of the earth, during volcanic eruption it becomes available for laboratory analysis.

(iii) Why do earthquake waves develop shadow zone?

Answer

Earthquake wave develop shadow zone because P and S waves follow a curved path inside the earth due to increasing capacity. The shadow zone of S-wave is much larger than that of the P-waves.

(iv) Briefly explain the indirect sources of information of the interior of the earth other than those of seismic activity.

Answer
The indirect sources of information of the interior of the earth are:

• Temperature, Pressure and Density: These increase with the increasing distance from the surface towards the interior in deeper depths.
The rate of change of Temperature, pressure and density are known. Knowing the total thickness of the earth, scientists have estimated the values of temperature, pressure and the density of materials at different depths.

• Meteors: These are not from the interior of the earth but the material and the structure observed in the meteors are similar to that of the earth. This make them another source of information about the interior of the earth.

• Gravitation force: It is greater near the poles and less at the equator. The gravity values also differ according to the mass of material. The uneven distribution of mass of material within the earth influences this value.

• Magnetic Field: Magnetic surveys also provide information about the distribution of magnetic materials in the crustal portion, and thus, provide information about the distribution of materials in this part.

3. Answer the following questions in about 150 words.

(i) What are the effects of propagation of earthquake waves on the rock mass through which they travel?

Answer

The earthquake waves cause vibration in the body of the rocks through which they pass. P-waves vibrate parallel to the direction of the wave. This exerts pressure on the material in the direction of the propagation. As a

result, it creates density differences in the material leading to stretching and squeezing of the material. Other three waves vibrate perpendicular to the direction of propagation. The direction of vibrations of S-waves is perpendicular to the wave direction in the vertical plane. Hence, they create troughs and crests in the material through which they pass. Surface waves are considered to be the most damaging waves.

(ii) What do you understand by intrusive forms? Briefly describe various intrusive forms.

Answer

The lava that is released during volcanic eruptions on cooling develops into igneous rocks. These forms are called intrusive forms.

Various intrusive forms are:

• Batholiths: A large body of magmatic material that cools in the deeper depth of the crust develops in the form of large domes. These are the cooled portion of magma chambers.

• Laccoliths: These are large dome-shaped intrusive bodies with a level base and connected by a pipe-like conduit from below. It resembles the surface volcanic domes of composite volcano, only these are located at deeper depths.

• Lapolith: As and when the lava moves upwards, a portion of the same may tend to move in a horizontal direction wherever it finds a weak plane. It may

get rested in different forms. In case it develops into a saucer shape, concave to the sky body, it is called lapolith.

• Phacolith: A wavy mass of intrusive rocks located near the top of an anticline or the bottom of a syncline.

• Sills: The near horizontal bodies of the intrusive igneous rocks are called sill or sheet, depending on the thickness of the material. The thinner ones are called sheets while the thick horizontal deposits are called sills.

• Dykes: When the lava makes its way through cracks and the fissures developed in the land, it solidifies almost perpendicular to the ground. It gets cooled in the same position to develop a wall-like structure. Such structures are called dykes.