NCERT MOST IMPORTANT QUESTIONS CLASS – 11 GEOGRAPHY CHAPTER- 3 INTERIOR OF EARTH

Question 1.
How do the rocks of the earth's mantle behave when subjected to the earthquake waves?
Answer:
The earth's mantle behaves as an elastic solid when subjected to the earthquake waves. It changes the shape of the landscape when stresses are applied, but returns exactly to its original shape when these stresses are removed.

Question 2.
What is asthenosphere?
Answer:
The asthenosphere is the zone of hot rocks, believed to be in a plastic condition, underlying the solid lithosphere or the earth's crust. It is sometimes termed as the soft layer of mantle or the low-velocity zone because the earthquake waves travel in it at reduced velocities.

Question 3.
Distinguish between Body waves and surface waves.
Answer:
The earthquake waves which travel longitudinally through the solid body of the earth are called Body waves. They move-faster. Those waves which move transversally along the surface are known as Surface waves. They move slowly and cause more disaster.

Question 4.
Define surface waves along with their sub-types.
Answer:
The earthquake waves which move along the free upper crust of the earth are called surface waves. Surface waves are of two types, viz, Rayleigh waves and Love waves. Rayleigh waves can be visualised as water waves travelling across the surface of a still pond after a pebble has been tossed into the water. But the motion in the Love waves is entirely horizontal, at right, angles to the direction of the wave motion. The Rayleigh and Love waves travel more or less the same length, but with different speeds.

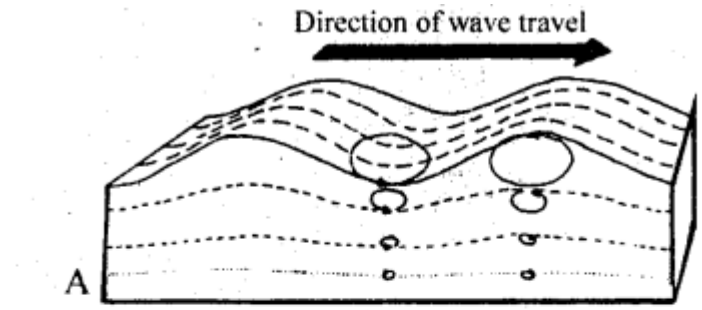

Fig.3.2 A : Rayleigh waves

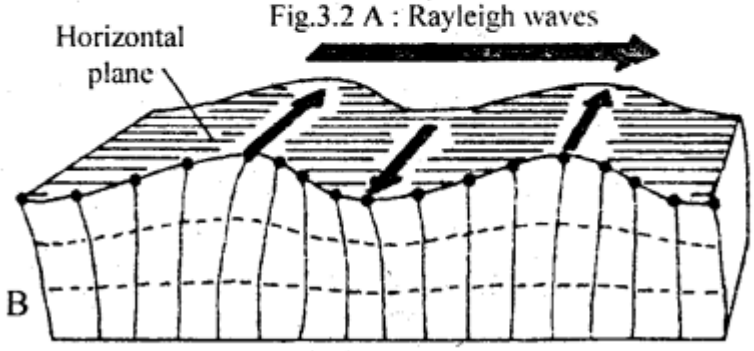

Fig.3.2 B : Love waves

Question 5.
Describe the three types of earthquake waves.
Answer:
These waves are :

1. 'P'waves or longitudinal waves-These are also known as primary waves. These travel in the direction of their movement. They can travel through solids as well as liquid and gaseous matter.
2. 'S' waves or transverse waves – These are also known as secondary waves. These travel at a right angle to the direction of their oscillation. They can travel in solid '? medium only.
3. 'L' waves – These are known as surface waves. These waves do hot go deep into the earth.

Question 6.
Write short notes on :
1. Shadow zone
2. The earth's crust
Answer:
1. Shadow zone – It lies beneath the surface of the earth, i.e., in its interior. The seismic waves bend as they travel through the core and, therefore, 'P' waves are not directly received in a zone known as the shadow zone. Also, 'S' waves are not received there because they do not travel through the liquid outer core. Only surface waves are received in the shadow zone.

2. The earth's crust – This is also known as the lithosphere. The crust is the outermost shell 1 of the earth. It consists of the surface granite SIAL and the intermediate basic SIMA layers. It is separated from the under layer MANTLE by the Mohorovicic Discontinuity. There are two kinds of crust – continental and oceanic. Continental crust

has an average density of 3 g/cnt3, the average thickness of 35 to 40 km. (22 to 25 miles) with large areas older than 1500 million years. Continental crust is a complicated structure and has a variable composition. Oceanic crust is thinner than continental crust. Its average density is 2.7 g/cm3 and average thickness of only 6 km. (3.7 miles), with the simple layered structure of the uniform composition.

Question 7.
Discuss how do seismic waves suggest layering of the earth's interior.
Answer:
Seismic waves are the earthquake waves. The movement of seismic waves tells us a great deal about the earth's internal structure. The shock waves arising from earthquakes pass through the interior of the earth in different ways and provide evidence about the inaccessible interior region of the earth. Seismic waves are of two types -: body waves and surface waves. Body waves travel through the solid body of the earth, whereas surface waves move along the free upper crust of the earth. Surface waves, in turn, are of two types, viz, Rayleigh waves and Love waves.

Body waves also have two sub-types, viz, 'P' waves and 'S' waves. 'P' (primary waves) pass through all the medium solid, liquid and gaseous, whereas 'S' or secondary waves do not pass through liquids.

Based on the above observation related to seismic waves, the interior has been divided into three layers – core, mantle and crust.

The core is the innermost or central layer, the crust is the outermost layer, whereas mantle lies in the middle. Since 'S' waves cannot pass through the central part of the earth or core, it suggests that this part is made up of a medium which is not solid. This proves that the earth's outer core is in a liquid state in contrast to the surrounding mantle which is solid.

The 'P' waves make an abrupt drop in velocity at the mantle-core _ boundary, whereas 'S' waves terminate here. Based on the behaviour of seismic waves, the mantle is sub-divided into two major parts – the upper mantle and the lower mantle.

The crust is distinguished from the mantle by the presence of an abrupt change in velocity of seismic waves. The change in rigidity, in turn, is due to change in the universal composition or in the physical state of the rocks.

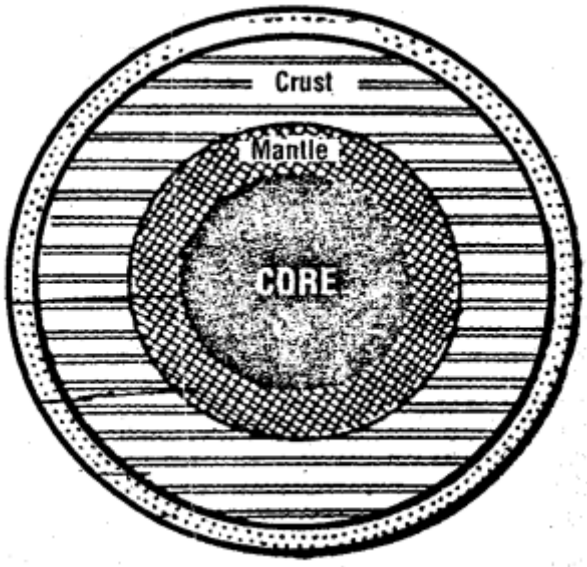

Fig.3.3 : The earth's interior

Question 8.
Describe the earth's mantle.
Answer:
The mantle is that part of the earth's interior which lies between the core and the crust. It consists of solid ultrabasic rocks. The mantle is about 2900 km thick with a density of about (3.0 to 3.4) g/cm3. The lower surface of the mantle forces Gutenberg Discontinuity, the uppermost layer forces the Asthenosphere.

The 'P' or primary earthquake waves make an abrupt drop in velocity at the mantle-core boundary, whereas 'S' or secondary waves terminate at this boundary. . It is because of the presence of a plane of the discontinuous surface between the core and the mantle known as Gutenberg Discontinuity.

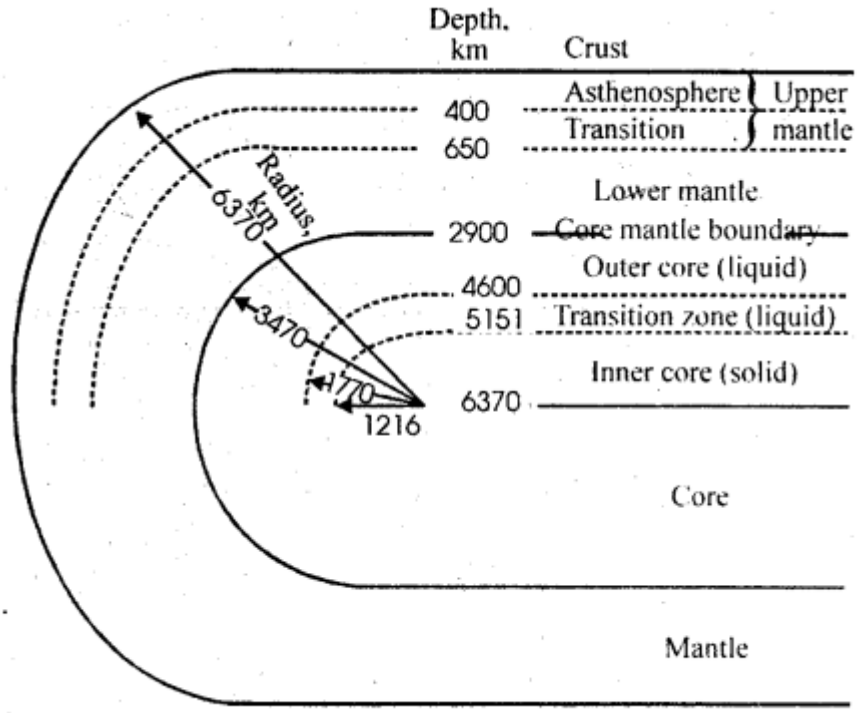

Fig.3.4 : Dimensions of the Earth's Mantle and Core

Based on the behaviour of seismic waves, the mantle is sub-divided into two major parts – the upper mantle and the lower mantle. The upper mantle extends from the crust to a depth of about 650 km. and includes 300 to 400 km wide Asthenosphere, the uppermost part of the mantle. Rocks in Asthenosphere behave as an elastic solid. This region is referred to as the low-velocity zone.

Question 9.

How do the waves of different types tell us about the changes in the nature of different layers of the earth's interior?
Answer:
Seismic waves are the earthquake waves. The movement of seismic waves tells us a great deal about the earth's internal structure. The shock waves arising from earthquakes pass through the interior of the earth in different ways and provide evidence about the inaccessible interior region of the earth. Seismic waves are of two types -: body waves and

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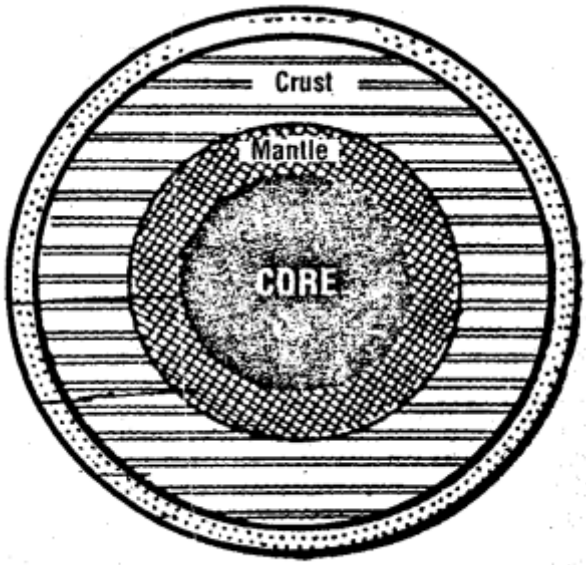

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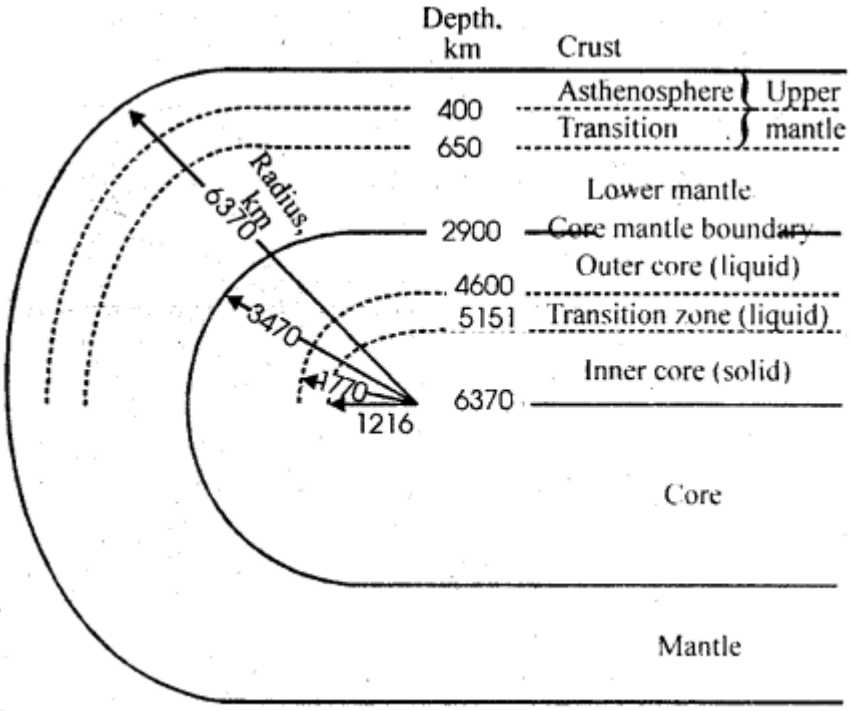

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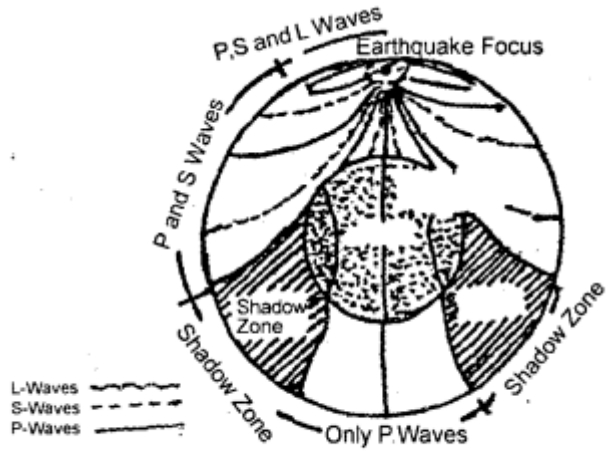

Fig.3.5 : Cross-section of the earth showing diagrammatically the paths of P,S and L waves

Question 10.
Distinguish between :
1. Body Waves and Surface Waves
2. The crust of the earth and Core of the earth
3. Gutenberg Discontinuity and Mohorovicic Discontinuity
Answer:
1. Body waves and Surface Waves :
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through the interior of the earth in different ways and provide evidence about the inaccessible interior region of the earth. Seismic waves are of two types -: body waves and surface waves. Body waves travel through the solid body of the earth, whereas surface waves move along the free upper crust of the earth. Surface waves, in turn, are of two types, viz, Rayleigh waves and Love waves.

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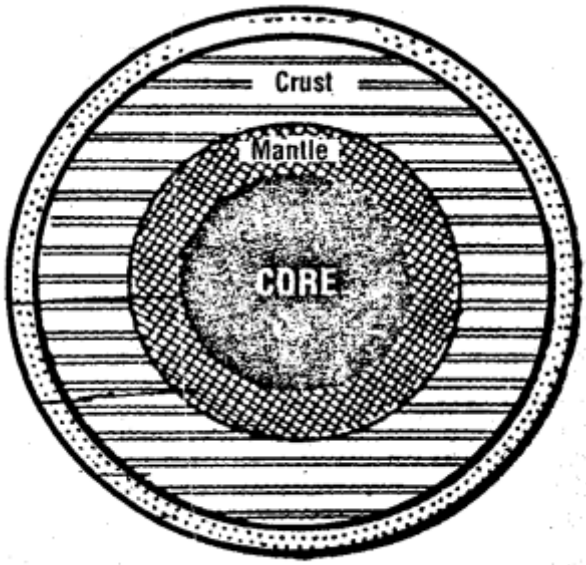

Fig.3.3 : The earth's interior

2. Crust of the earth and Core of the earth:

The crust of the Earth	The core of the Earth
I. This is the outermost layer of the earth.	1. This is the innermost layer ofof the earth.
2. The average density is 2.73g/cm3.	2. The average density is I7.2g/cm3.
3. It covers about 0.5% part of the earth.	3. It covers about 83% part of thethe earth.
4. It is made up of silica andaluminium.	4. It is made up of nickel and ferrous.

3. Gutenberg Discontinuity and Mohorovicic Discontinuity:

Gutenberg Discontinuity	Mohorovicic Discontinuity
1. It is the boundary between the mantle and the core.	1. It is the boundary between the crust arid the mantle.
2. It was observed by Beno Gutenberg in 1926.	2. It was observed by a Yugoslavian seismologist Mohorovicic in 1909.
3. The ‘P’ waves make an abrupt drop in the velocity at the mantle-core boundary, while S-waves disappear here.	3. The surface of a sudden increase in wave velocity, which separates crust above from the mantle below is Mohorovicic discontinuity.
4. This making a place at the dis-continuous surface between the core and mantle is known as Gutenberg discontinuity.	