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Maharashtra State Board Class 11 Geography Solutions Chapter 2 Weathering and Mass Wasting

1. Complete the Chain.

Question 1.

Rock type	Name of the rock	Dominant type of weathering
(1) Igneous	(1) Dolomite	(1) Physical Weathering
(2) Sedimentary	(2) Slate	(2) Chemical Weathering
(3) Metamorphic	(3) Basalt	
	(4) Limestone	
	(5) Granite	

Answer:

Rock type	Name of the rock	Dominant type of weathering
(1) Igneous	(1) Basalt Granite	(1) Physical Weathering Physical Weathering
(2) Sedimentary	(2) Dolomite Limestone	(2) Chemical Weathering Chemical Weathering
(3) Metamorphic	(3) Slate	(3) Physical Weathering

2. Identify the correct correlation.

A : Assertion
R : Reasoning
Question 1.
A – In areas of high rainfall, slides are very common.
R – Types of mass wasting movements are dependent on a region's climate.
(a) Only A is correct.
(b) Only R is correct.
(c) Both A and R are correct and R is the correct explanation of A.
(d) Both A and R are correct but R is not the correct explanation of A.
Answer:
(d) Both A and R are correct but R is not the correct explanation of A.

Question 2.
A – Gravity is a major factor in mass wasting.
R – Gravity pulls all things down to the earth's surface.
(a) Only A is correct.
(b) Only R is correct.
(c) Both A and R are correct and R is the correct explanation of A.
(d) Both A and R are correct but R is not the correct explanation of A.
Answer:
(c) Both A and R are correct and R is the correct explanation of A.

Question 3.
A – Freeze and thaw weathering is common in desert areas.
R – Water gets into cracks and breaks the rocks.
(a) Only A is correct.
(b) Only R is correct.
(c) Both A and R are correct and R is the correct explanation of A.
(d) Both A and R are correct but R is not the correct explanation of A.
Answer:
(d) Both A and R are correct but R is not the correct explanation of A.

Question 4.
A – Surface water helps solifluction.
R – Water table is responsible for the same.
(a) Only A is correct.
(b) Only R is correct.
(c) Both A and R are correct and R is the correct explanation of A.

(d) Both A and R are correct but R is not the correct explanation of A.
Answer:
(a) Only A is correct.

3. Identify the correct group.

Question 1.

A	B	C	D
(1) Oxidation	(1) Solution	(1) Fall	(1) Pressure
(2) Carbonation	(2) Salt weathering	(2) Creep	(2) Temperature
(3) Freeze thaw weathering	(3) Oxidation	(3) Slide	(3) Slope
(4) Shattering	(4) Carbonation	(4) Flow	(4) Rainfall

Answer:
C

4. Give geographical reasons.

Question 1.
Temperature is the main factor behind granular weathering.
Answer:
Temperature is the main factor behind granular weathering because-

1. In hot desert areas, diurnal range of temperature is high.
2. As the temperature increases with the rising sun, the rock gets heated and cools down with the decrease in temperature.
3. The minerals in the rock react differently to the temperature increase due to continuous heating and cooling.
4. Consequently, it leads to development of stress within the rock and molecular or granular disintegration takes place.

Question 2.
Human is an agent of weathering.
Answer:
Human is an agent of weathering because-

1. Man is a biological agent of weathering. Due to economic and technological development, man has become the most powerful agent of weathering and erosion.
2. Mining, blasting of hills and ridges for road and dam construction, quarrying for industrial and building materials, etc., results in a fast rate of disintegration of rocks.
3. Man accelerates the rate of weathering on hill slopes through activities like deforestation.

Question 3.
Slope is a major factor in mass wasting.
Answer:
Slope is a major factor in mass wasting because-

1. Mass wasting is the down-slope movement of loose mixture of soil, land and rock particles by the force of gravity.
2. In mass wasting the materials come down the slope without the aid of transporting medium like running water, ice or wind.
3. Mass wasting occurs continuously on all slopes.
4. Some act very slowly, others very suddenly, often with disastrous results.

Question 4.
Oxidation changes the size and colour of the rocks.
Answer:
Oxidation changes the size and colour of the rocks because-

1. Oxygen in the air and water reacts with certain elements in the minerals inside the rock
2. In this process, the minerals in the rock react with the oxygen present in the air or water.
3. Metals, particularly iron and aluminium, commonly oxidize forming iron or aluminium oxides. It is also called rusting.
4. These oxides are larger in volume than in the original rocks.
5. The iron oxides are red in colour and aluminium oxides are yellow.
6. Thus, oxidation changes size and colour of the rock.

Question 5.
Effect of mass movement will be greater along the western slope of the Sahyadri's than the eastern slope.
Answer:
Effect of the mass movement will be greater along the western slope of the Sahyadri's than the eastern slope because-

1. The western slope of the Sahyadri's are steeper than the eastern slopes.

2. The western slopes receive more rainfall than the eastern slopes as a result mass movement is greater in western slopes than eastern slopes.
3. Also, the rivers as an agent of erosion are short and swift on the western slope and thus rapid mass movement is found as compared to eastern coast.

5. Write short notes on.

Question 1.
Gravity and Solifluction
Answer:
Gravity:

1. It is the main force responsible for mass movements.
2. It is a force that acts everywhere on the earth's surface, pulling everything down.
3. If the friction on the rock is stronger than gravity for a particular slope, the rock material is likely to stay.
4. But if the gravity is stronger, movement will occur in the direction of the slope.

Solifluction:

1. Solifluction is the name for the slow downhill creep of soil, which occurs in a variety of climatic conditions.
2. It occurs in periglacial or alpine regions.
3. As permafrost is impermeable to water, soil overlying may become oversaturated and slide slopes down under the pull of gravity.

Question 2.
Role of water in mass wasting
Answer:

1. Although water is not always directly involved as a transporting medium but it plays an important role in mass wasting.
2. Addition of water from rainfall or snowfall or melting of snow makes the material on the slope heavier.
3. Water can reduce the friction along a sliding surface.

Question 3.
Exfoliation
Answer:

1. Because of the overlying rocks, the rocks beneath the surface experience a lot of pressure.
2. The exposed part of the rock heats more while the inner part is comparatively cooler.
3. As a result, the outer layer of the rocks fall apart from the main rock just as we peel off onion.

Question 4.
Weathering and homogeneity in rocks
Answer:

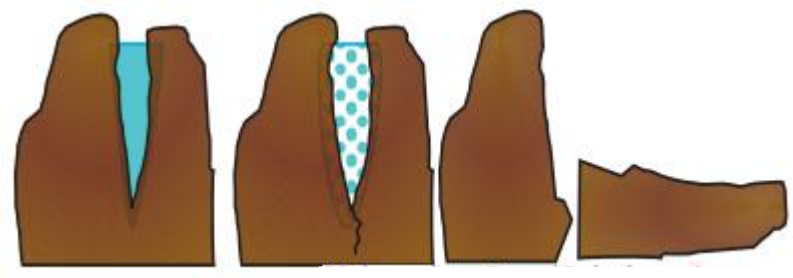
1. Weathering is the physical or chemical breakdown of rocks into small pieces due to various reasons like weather conditions, temperature, and water, living organisms like humans, algae, fungi, etc.
2. Weathering depend upon the texture of the rock. Those rocks which have joints on layers break easily than rocks which are homogeneous. Generally, sedimentary rocks break easily than igneous rocks as sedimentary rocks are formed by layering.
3. Sediments brought down by the river are deposited in layers, thus sedimentary rocks are soft and porous, and can be broken easily.
4. Igneous rocks are formed by cooling and solidification of molten magma. Hence, they are hard and non-porous and cannot be broken so easily.
5. Thus, sedimentary rocks are more subjected to weathering than the igneous rocks.

Question 5.
Carbonation
Answer:

1. The decomposition of dead matter in the soil produces CO_2
2. This CO_2 and the CO_2 in the air reacts with minerals in the rocks.
3. Minerals such as feldspar and carbonates decompose when this happens.
4. In humid climate, water adds to the weathering process.
5. In arid climates, the absence of water in the region leads to carbonate rocks to form cliffs that are resistant.
6. Often, carbonation and solution occur simultaneously.
7. During carbonation, the calcium and carbonate in limestone detach from each other, thereby decomposing the limestone.

6. Draw a neat and labelled diagram for

Question 1.
Freeze and thaw weathering
Answer:



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Question 2.
Block disintegration
Answer:

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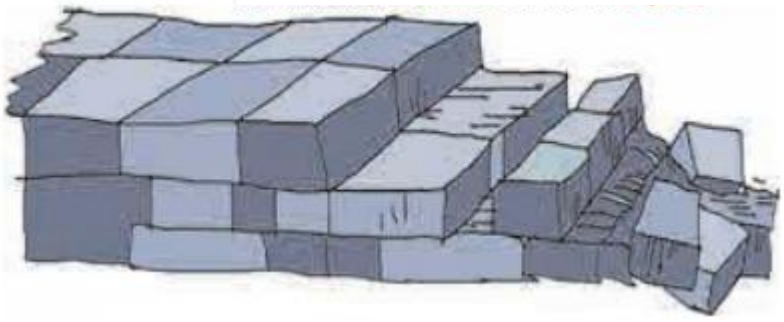

Question 3.
Biological Weathering
Answer:

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7. Answer in detail.

Question 1.
Explain with examples the process of weathering happening in Konkan.
Answer:

1. Konkan, also known as the Konkan Coast is a rugged, section of the western coastline of India.
2. The region is divided into North Konkan including Mumbai, Thane and Raigad districts whereas South Konkan include Ratnagiri and Sindhudurg districts.
3. Laterite rocks-occur in the form of plateaus at Konkan strip. High altitude laterite plateaus are found is Sitara, Kolhapur, Ratnagiri and Sindhudurg district.
4. In the laterite rocks soft silica matter is present.
5. Because of high rainfall exposed rocks become empty to wash out of soft silica matter.
6. Laterite soil is formed by laterite rock in high elevation. The soil contains has high concentration of ferrous and aluminium. This soil is very stony because of the presence of weathering fragments of iron concentrations.
7. Oxygen in the air and water reacts with certain elements in the minerals in the rock. The metals in the rock particularly iron and aluminium oxidise and form iron and aluminium oxides. Thus, chemical weathering takes place.
8. Laterite soil is found in Mahabaleshwar, Southern parts of Mahabaleshwar, around Bhima Shankar and Matheran. Thus, chemical and mechanical weathering is found.

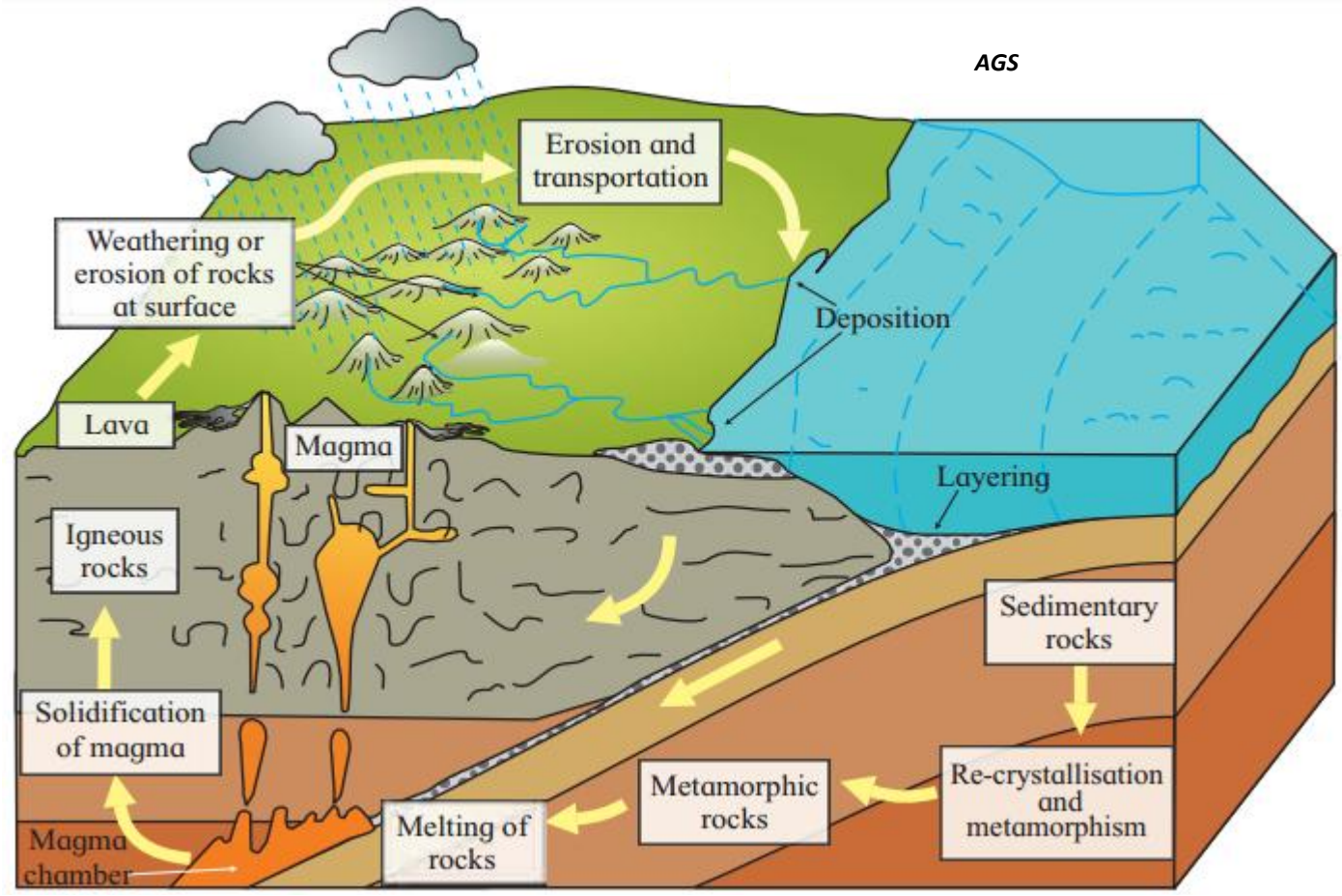
Question 2.
Explain the correlation between Himalayas and mass movements. Give examples wherever necessary.
Answer:

1. Mass movements occur in hilly, mountainous or plateau areas. The steeper the slope more the occurrences of mass movement.
2. The Himalayas have greatest relief, high potential energy, high seismic activity, steep slopes, strong weathering, great snow fall etc.
3. Due to slope, gradient, massive rockslides, debris flow takes place.
4. Steep gradient of precipitation and temperature produce mass movement that loads glacier surface and chokes, rivers with sediments.
5. For example, in Kosi river basin of Himalayas of central Nepal, because of deep weathering, high seismic activity, river undercutting, deforestation and heavy precipitation, especially during the summer months, mass movements are most frequent in highly jointed, sheared, intensely folded and fault rocks.
6. Thus, in short, in the Himalayan region, due to steep slope, melting of glaciers, precipitation, seismic activity, mass movement takes place on a larger scale.

11th Geography Digest Chapter 2 Weathering and Mass Wasting Intext Questions and Answers

Let’s recall (Textbook Page No. 15)

1. Study the diagram in fig 2.1 and answer the following questions.



Question 1.
Identify the types of rocks shown in the diagram.
Answer:
Igneous, sedimentary and metamorphic rocks are shown in the diagram.

Question 2.
Arrange the rocks according to their chronology of origin.
Answer:
Igneous, sedimentary and metamorphic rocks.

Question 3.
Explain how sedimentary rocks are formed.
Answer:
Sedimentary rocks are formed from layering upon layering of all the organic (dead remains of plants and animals) and in organic (sand, silt, clay, gravel, etc.) material in a depression or on low lying area. If there are cementing material like limestone, hardening and compaction takes place, then sedimentary rocks are formed.

Question 4.
Think of all the factors which may break the rocks into smaller pieces.
Answer:
Heat, pressure, water, wind, animals, plants etc., can break rocks into smaller pieces.

Question 5.
Which type of rock will break easily as compared to others? Why?
Answer:

1. Sedimentary rocks will break easily as they are formed by layering of sediments and thus, they are soft and porous and are broken easily.
2. Igneous rocks are formed from cooling and solidification of molten magma; hence they are hard and non- porous.
3. The metamorphic rocks too cannot be broken easily as they are formed from heat and pressure.

Think about it.

Question 1.
In which regions will freeze-thaw weathering not be effective? (Textbook Page No. 17)
Answer:
Freeze-thaw weathering will not be effective on the cold polar regions as the soil cover and rocks are very little on the polar areas and moreover, there is snow everywhere.

Question 2.
Besides climatic factors, rock type and structure, can you think of some more factors that affect weathering? (Textbook Page No. 19)
Answer:
Plants, animals, micro-organisms, humans are some more factors that affect weathering.

Question 3.
Can tectonic forces be responsible for mass movement? (Textbook Page No. 25)
Answer:

1. Plate tectonics are responsible for uplift and mountain building that creates and maintains slopes.
2. Mass wasting is common in tectonically active regions.
3. Plate tectonics causes earthquakes that can trigger landslides and cause sediment to lose its strength through liquefaction.

Question 4.
There is a shift of materials in mass movement as well as in transportation from one place to the other. So, why can't both not be treated as one and the same? (Textbook Page No. 25)
Answer:
Mass movement is caused by abrupt movement and freefall of loosened rock particles because of gravity and friction falling towards the surface, whereas transportation is carrying of rock materials with the help of agents of erosion such as water, wind, air, ice, etc. Thus, they are not same.

Use your brain power!

Question 1.
Can animals and plants also influence weathering? Will that be physical or chemical weathering? Which type of weathering does stone quarrying cause? (Textbook Page No. 19)
Answer:
Yes, burrowing animals widen the fissures in the rocks. Rocks become weak and disintegrate.

The roots of the trees and other plants penetrate in the soil, they grow in size, exert pressure on rocks, widen cracks in the rocks and rocks break. Many microscopic organisms such as algae, lichens, bacteria, moss etc produce chemicals and they break down the outer layer of the rock. These chemicals are responsible for physical and chemical weathering of rocks. The stone quarrying causes the anthropogenic weathering.

2. A region is having an annual mean temperature of 5° C and an annual rainfall of 1000 mm. Can you comment upon the weathering and the type with the help of following questions? (Textbook Page No. 20)

Question 1.
Which type of weathering will be dominant here?
Answer:
Physical weathering will be dominant here.

Question 2.
Where will such a region be found?
Answer:
Such a region will be found in permafrost conditions, alpine and periglacial region.

Question 1.
Complete the table by using the words: intense, moderate, slight and very slight or no weathering. (Textbook Page No. 20)
Answer:
Rate of Physical Weathering:

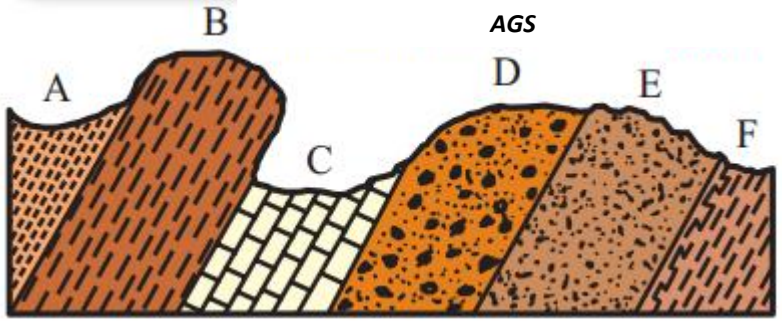
	High rainfall	Moderate rainfall	Low rainfall
High temperature	Intense	Moderate	Intense
Moderate temperature	Intense	Moderate	Slight
Low temperature	Moderate	Slight	No weathering

Rate of Chemical Weathering:

	High rainfall	Moderate rainfall	Low rainfall
High temperature	Intense	Moderate	Moderate
Moderate temperature	Intense	Moderate	Slight
Low temperature	Moderate	Slight	Slight

Can you tell? (Textbook Page No. 21)

1. See the diagram given in fig 2.10 and answer the following questions.



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Question 1.
Which rock layer has experienced the most weathering?
Answer:
Rock layer C has experienced the most weathering.

Question 2.
Which rock layer has experienced the least weathering?
Answer:
Rock layer B has experienced the least weathering.

Question 3.
What could be the reason behind difference in weathering?
Answer:
Rock C has lot of fractures and joints so it got weathered easily.
Rock B might have been a hard rock, more resistant, so weathering process is slow.

2. The satellite images given in fig. 2.11 A and B belong to the same location but different timeline. Study the images and answer the following questions. (Textbook Page No. 21)

Fig. 2.11 : A)

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Fig. 2.11 : B)

Question 1.
Compare the images and tell what differences do you find in these images?
Answer:
Image 2.11 (A) shows maximum area under vegetation. Image 2.11 (B) shows development in form of settlements and transportation routes.

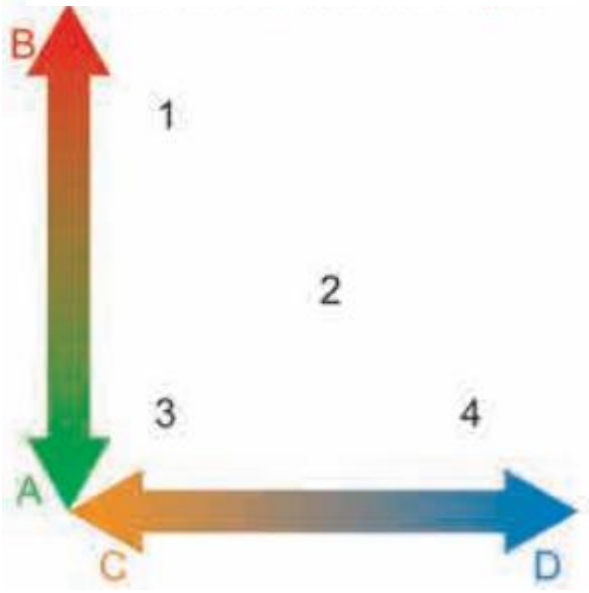
Question 2.
In 2019, what does the patch of land going from north-west to south-east signify? Why was it not there in 2011 image?
Answer:
The sweeping portion from north-west to south-east is visible in satellite image of 2019. This is because the village is located at the foothills. The rain and slope were responsible for the mudslide. Heavy rainfall and absence of vegetation aggravated the situation. In 2011, vegetation was thick but in 2019 deforestation has been done extensively for farming practices.

Question 3.
To what extent is the climate of a place responsible for this disaster?
Answer:
Climate plays an important role for the disaster. Heavy rainfall makes soil to move from the surface of the mountain towards the foothills.

Question 4.
Which other factors are responsible for the disaster?
Answer:
Deforestation and absence of vegetation are responsible for this.

Give it a try.

1. Study the following schematic diagram. It shows the relationship between speed of material and moisture content. Read the index, and answer the following questions. (Textbook Page No. 23)



(A) Fast (B) Slow (C) Dry (D) Wet
(1) Creep (2) Slide (3) Fall (4) Flow

Question i.
What will happen when the weather conditions are dry?
Answer:
There will not be moisture content hence speed of material will be low.

Question ii.
When will a flow occur?
Answer:
Flow will occur when the moisture content as well as speed of material will be high.

Question iii.
When will a creep occur?
Answer:
Creep will occur when speed of material will be slow.

Question iv.
Now can you enumerate the factors which affect mass wasting?
Answer:
Factors such as gravity, slope of land, climate of region, amount of water, material and structure of the rock affect mass wasting.

Question 2.
On the basis of given points, differentiate between weathering and erosion. (Textbook Page No. 25)
Answer:
Table

Think a little. (Textbook Page No. 24)

Think of the reason why landslides should be more frequent in foothill zone of the Himalayas and Western Ghats region. Why do landslides not occur in Marathwada
Answer:

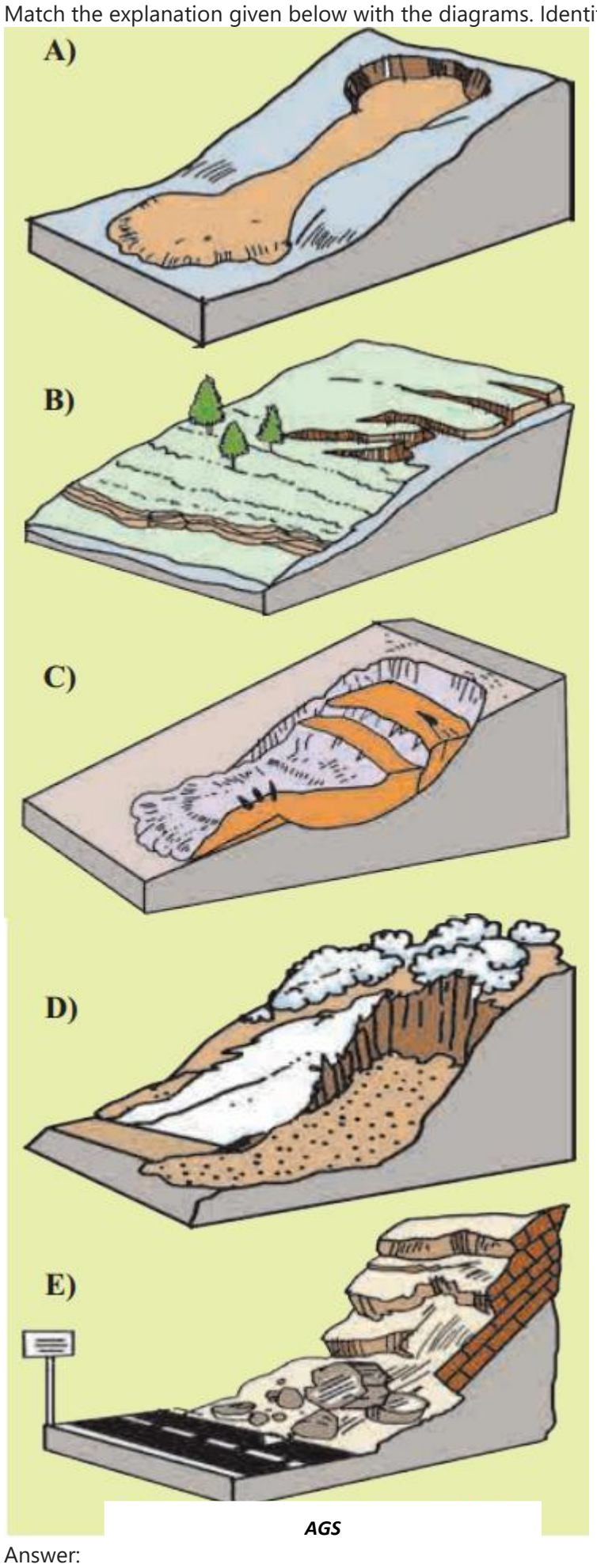
Himalayas are one of the youngest fold mountains of the world. They are formed due to convergent movement of the Indian plate and erosion plate. They are still rising in height. These tectonic movements cause frequent earthquakes in the region resulting into landslides whereas western Ghats lie in the stable Deccan shield less prone to landslides.

Himalayas are greater in height than the western Ghats. The slopes are comparatively steep and hence landslides are common in Himalayas whereas, the western Ghats are much lesser in height than the Himalayas hence less prone to landslides as compared to Himalayas.

The perennial rivers in Himalayas carry lots of sediments during rainfall and due to melting of glaciers in the summer thus leading to landslides, whereas, in Western Ghats many rivers are non-perennial and hence less amount of silt and debris in carried as compared to Himalayan rivers. Thus, there is reduction in the chances of landslides, only during the rainy season, landslides occur in Western Ghats region.

Try this. (Textbook Page No. 24)

Question 1.
Different types of materials flow down the slope. Types of mass wasting depend on their speed. Observe the pictures given in figure 2.12. Match the explanation given below with the diagrams. Identify them as slow or rapid movements.



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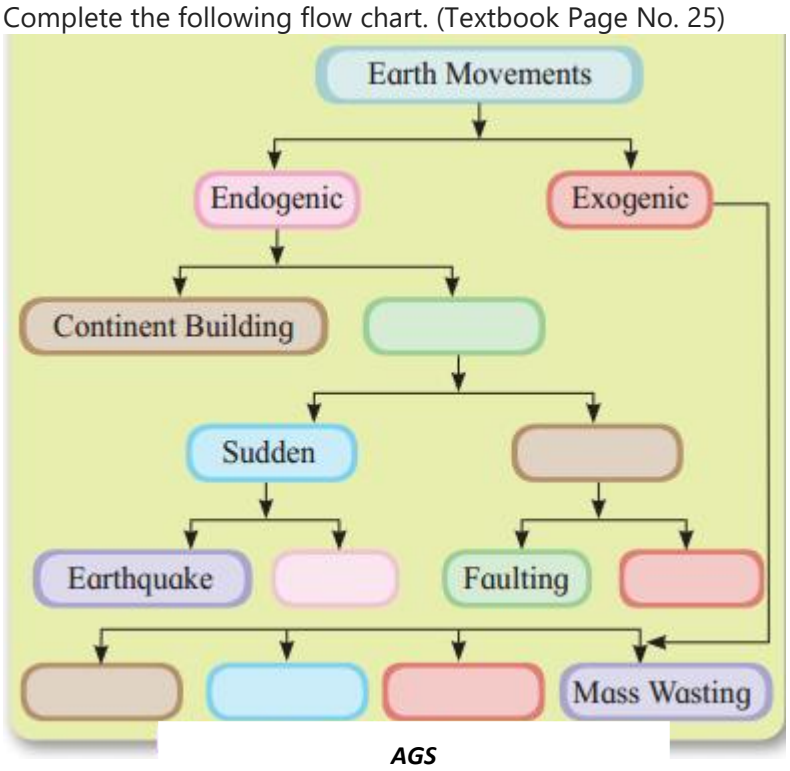
Answer:
A – Earth flow – Rapid or slow movement
B – Creep – Slowest movement
C – Land slide – Rapid movement

D – Solifluction – Slow movement
E – Rock fall – Rapid movement

Question 2.
Complete the following flow chart. (Textbook Page No. 25)



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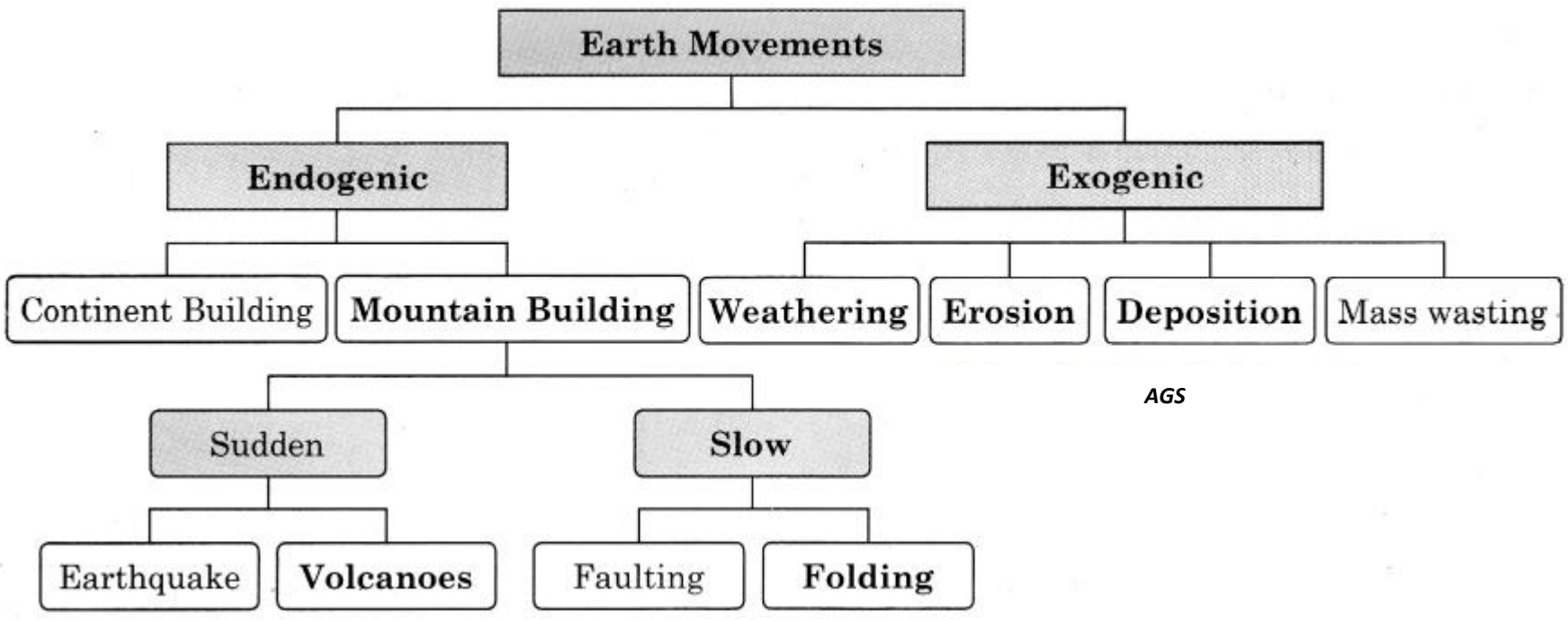
Answer:



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