



CHAPTER 6: Geomorphic Processes

Question 1:

Which of the following processes are associated with diastrophism?

1. Orogenic processes
2. Epeirogenic process
3. Earthquakes
4. Plate tectonics

Select the correct answer using the code given below.

1. 1 and 4 only
2. 2 and 4 only
3. 1, 2 and 3 only
4. 1, 2, 3 and 4

Correct Answer : 4

Explanation

All processes that move, elevate or build up portions of the earth's crust come under diastrophism. They include:

- **Orogenic processes** involve mountain building through severe folding and affecting long and narrow belts of the earth's crust. In the process of orogeny, the crust is severely deformed into folds. Orogeny is a mountain building process.
 - **Epeirogenic processes** involving uplift or warping of large parts of the earth's crust. Due to epeirogeny, there may be simple deformation. Epeirogeny is continental building process.
 - **Earthquakes** involving local relatively minor movements.
 - **Plate tectonics** involving horizontal movements of crustal plates. All these processes cause pressure, volume and temperature (PVT) changes which in turn induce metamorphism of rocks. **Hence option (d) is the correct answer.**
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Question 2:

Consider the following statements about endogenic and exogenic forces:

1. Diastrophism and volcanism are endogenic geomorphic processes.
2. Weathering, mass wasting, erosion and deposition are exogenic geomorphic processes.

Which of the statements given above is/are correct?

1. 1 only
2. 2 only
3. Both 1 and 2
4. Neither 1, nor 2

Correct Answer : 3

Explanation

- The endogenic and exogenic forces causing physical stresses and chemical actions on earth materials and bringing about changes in the configuration of the surface of the earth are known as geomorphic processes. Diastrophism and volcanism are endogenic geomorphic processes. These have already been discussed in brief in the preceding unit. Weathering, mass wasting, erosion and deposition are exogenic geomorphic processes. **Hence, both the statements are correct and option (c) is the right answer.**
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Question 3:

The energy emanating from within the earth is the main force behind endogenic geomorphic processes. This energy is mostly generated by:

1. Radioactivity
2. Rotational and tidal friction
3. Primordial heat from the origin of the earth

Select the correct answer using the code given below.

1. 1 only
2. 1 and 3 only
3. 2 and 3 only
4. 1, 2 and 3

Correct Answer : 4

Explanation

- The energy emanating from within the earth is the main force behind endogenic geomorphic processes.
 - **This energy is mostly generated by radioactivity, rotational and tidal friction and primordial heat from the origin of the earth.** This energy due to geothermal gradients and heat flow from within induces diastrophism and volcanism in the lithosphere. **Hence, option (d) is the right answer.**
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Question 4:

Which of the following processes are associated with denudation?

1. Weathering
2. Erosion
3. Mass movement

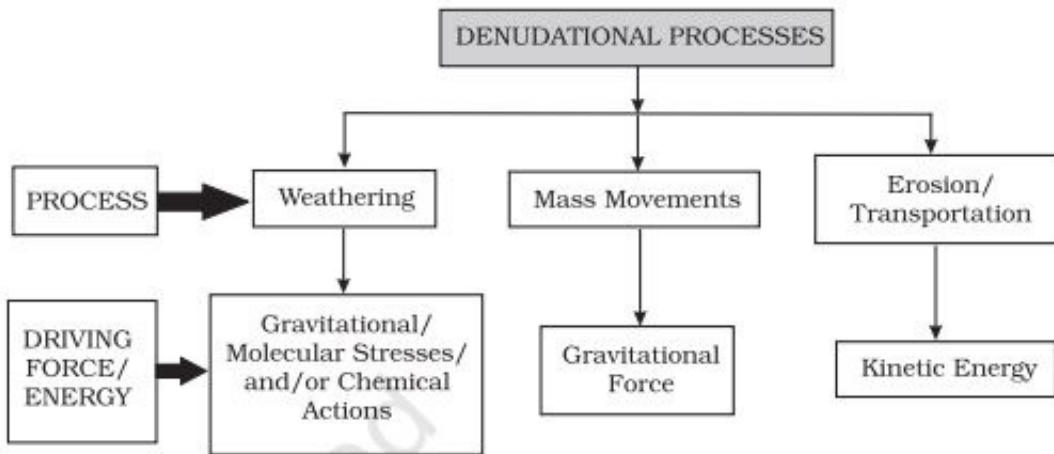
Select the correct answer using the code given below.

1. 1 only
2. 1 and 2 only
3. 2 and 3 only
4. 1, 2 and 3

Correct Answer : 4

Explanation

- All the exogenic geomorphic processes are covered under a general term, denudation. The word 'denude' means to strip off or to uncover. Weathering, mass wasting/movements, erosion and transportation are included in denudation. **Hence, option (d) is the right answer.**



Denudational processes and their driving forces

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Question 5:

Consider the following statements regarding chemical weathering:

1. Wetting and drying of rock may result in chemical weathering.
2. Oxidation of rock results in chemical weathering.

Which of the statements given above is/are **NOT** correct?

1. 1 only
2. 2 only
3. Both 1 and 2
4. Neither 1 nor 2

Correct Answer : 4

Explanation

- Wetting and drying of rock is a chemical weathering process. Hydration is the chemical addition of water. Minerals take up water and expand; this expansion causes an increase in the volume of the material itself or rock. Calcium sulphate takes in water and turns to gypsum, which is more unstable than calcium sulphate. **Hence, statement 1 is correct.**
 - Oxidation occurs where there is ready access to the atmosphere and oxygenated waters. The minerals most commonly involved in this process are iron, manganese, sulphur etc. In the process of oxidation rock breakdown occurs due to the disturbance caused by addition of oxygen. **Hence, statement 2 is correct and option (d) is the correct answer.**
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Question 6:

Consider the following statements regarding weathering:

1. Gravitational force has no impact on physical weathering.
2. Both chemical and physical weathering may result in exfoliation.
3. Unloading of rocks favors physical weathering.

Which of the statements given above is/are correct?

1. 1 only
2. 1 and 3 only
3. 2 and 3 only
4. 1, 2 and 3

Correct Answer : 3

Explanation

- Gravitational force affects both physical as well as chemical weathering. **Hence, statement 1 is not correct.**
- Exfoliation can be caused by both physical as well as chemical weathering. **Hence, statement 2 is correct.**
- Unloading of rocks favors physical weather as the pressure above the rock decreases and rock expands. **Hence, statement 3 is correct.**
- Freezing, thawing and frost wedging results in physical weathering as it results in periodic expansion and contraction of the rocks.
- Salt weathering results in physical weathering. Salts in rocks expand due to thermal action, hydration and crystallisation.
- Various minerals in rocks possess their own limits of expansion and contraction. Because of diurnal changes in the temperatures, the internal movement among the mineral grains of the superficial layers of rocks takes place regularly.
- Weathering processes are responsible for breaking down the rocks into smaller fragments and preparing the way for formation of not only **regolith and soils, but also erosion and mass**

movements.

- **Biomes and biodiversity is basically a result of forests (vegetation) and forests depend upon the depth of weathering mantles.** Erosion cannot be significant if the rocks are not weathered. That means, weathering aids mass wasting, erosion and reduction of relief and changes in landforms are a consequence of erosion.
 - **Weathering of rocks and deposits helps in the enrichment and concentrations of certain valuable ores** of iron, manganese, aluminium, copper etc., which are of great importance for the national economy.
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Question 7:

Consider the following statements about Mass movements.

1. Weathering is not a prerequisite for mass movement though it aids mass movements.
2. Mass movements are aided by gravity and no geomorphic agent participates in the process of mass movements.
3. Mass movements are very active over weathered slopes rather than over unweathered materials.

Select the correct answer using the code given below.

1. 1 only
2. 2 and 3 only
3. 1 and 3 only
4. 1, 2 and 3

Correct Answer : 4

Explanation

- Gravity exerts its force on all matter, both bedrock and the products of weathering. So, weathering **is not** a prerequisite for mass movement though it aids mass movements.
 - Mass movements are **very active over weathered slopes** rather than over unweathered materials.
 - **Mass movements are aided by gravity and no geomorphic agent** like running water, glaciers, wind, waves and currents **participate in the process of mass movements.** That means mass movements do not come under erosion though there is a shift (aided by gravity) of materials from one place to another. **Hence all the statements are correct and option (d) is the correct answer.**
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Question 8:

Consider the following statement:

1. Solifluction does not occur in temperate regions.
2. Landslide is a rapid mass movement of saturated soil.
3. Humid climatic conditions promote rapid mass movement.

Which of the statements given above is/are correct?

1. 1 only
2. 2 and 3 only
3. 3 only
4. 1, 2 and 3

Correct Answer : 4

Explanation

- Solifluction which involves slow downslope flowing soil mass or fine grained rock debris saturated or lubricated with water. This process is quite common in **moist temperate areas** where surface melting of deeply frozen ground and long continued rain respectively, occur frequently. **Hence, statement 1 is not correct.**
 - Landslides are known as relatively rapid and perceptible movements. The materials involved are relatively dry. **Hence, statement 2 is not correct.**
 - Rapid mass movements are mostly prevalent in humid climatic regions and occur over gentle to steep slopes. Movement of water-saturated clayey or silty earth materials down low-angle terraces or hillsides is known as earthflow. **Hence, statement 3 is correct and option (c) is the correct answer.**
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Question 9:

Which of the following processes are classified as Rapid mass movement?

1. Creep
2. Solifluction
3. Earthflow
4. Avalanche

Select the correct answer using the code given below.

1. 1 and 2 only
2. 3 and 4 only
3. 2, 3 and 4 only
4. 1, 2, 3 and 4

Correct Answer : 2

Explanation

- **Creep:** is one type of mass movement which can occur on moderately steep, soil covered slopes. Movement of materials is **extremely slow** and imperceptible except through extended observation.
 - **Solifluction:** which involves **slow downslope flowing** soil mass or fine grained rock debris saturated or lubricated with water.
 - **Earthflow and Avalanche are classified as Rapid Movements.**
 - **Earthflow:** Movement of water-saturated clayey or silty earth materials down low-angle terraces or hillsides is known as earthflow.
 - **Avalanche:** It is a characteristic of humid regions with or without vegetation cover and occurs in narrow tracks on steep slopes. **Hence, option (b) is the correct answer.**
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Question 10:

Landslides occur very frequently in the Himalayas. Which of the following is/are the possible reasons behind this occurrence?

1. Himalayas are tectonically active.
2. Himalayas are mostly made up of sedimentary rocks and unconsolidated deposits.
3. The slopes are very steep in Himalayas.
4. Mechanical weathering due to temperature changes and ranges is pronounced.

Select the correct answer using the code given below.

1. 1 and 2 only
2. 3 and 4 only
3. 1, 2 and 3 only
4. 1, 2, 3 and 4

Correct Answer : 3

Explanation

Debris avalanches and landslides occur very frequently in the Himalayas. There are many reasons for this. One, the Himalayas are tectonically active. They are mostly made up of sedimentary rocks and unconsolidated and semi-consolidated deposits. The slopes are very steep. **Mechanical weathering due to temperature changes and ranges is not very high in Himalayan region hence, option (c) is the correct answer.**

Question 11:

Which of the following factors favour occurrence of debris avalanches and landslides in the Western Ghats and Nilgiris?

1. Steeper slopes with almost vertical cliffs
2. Tectonically stable region
3. Consolidated and hard rocks
4. Heavy amounts of rainfall over short periods
5. High range of temperature.

Select the correct answer using the code given below.

1. 1, 2 and 4 only
2. 1 and 4 only
3. 1, 4 and 5 only
4. 1, 2, 4 and 5 only

Correct Answer : 3

Explanation

Compared to the Himalayas, the Nilgiris bordering Tamil Nadu, Karnataka, Kerala and the Western Ghats along the west coast **are relatively tectonically stable and are mostly made up of very hard rocks;** but, still, debris avalanches and landslides occur though not as frequently as in the Himalayas, in these hills. Reasons behind this includes:

- Many slopes are steeper with almost vertical cliffs and escarpments in the Western Ghats and Nilgiris.
- Mechanical weathering due to temperature changes and ranges is pronounced.
- They receive heavy amounts of rainfall over short periods.

So, there is almost direct rock fall quite frequently in these places along with landslides and debris avalanches. **Hence, option (c) is the correct answer.**

Question 12:

Which of the following are included under soil forming factors?

1. Parent material
2. Topography
3. Climate
4. biological activity
5. Time

Select the correct answer using the code given below.

1. 1, 3 and 4 only
2. 1, 3, 4 and 5 only
3. 3, 4 and 5 only
4. 1, 2, 3, 4 and 5

Correct Answer : 4

Explanation

- Soil-forming Factors: Five basic factors control the formation of soils: (i) parent material; (ii) topography; (iii) climate; (iv) biological activity; (v) time. In fact soil forming factors act in union and affect the action of one another. **Hence option (d) is the correct answer.**
 - Under these **time, topography and parent material are considered as passive control factors** in soil formation.
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Question 13:

Consider the following statements:

1. Transport of soil material from upper layers of soil to lower levels by downward precipitation of water is called illuviation.
2. Deposition of soil material from upper layers of soil to lower levels is called eluviations.
3. Salts form into a crust in the soil due to water logging is known as hardpans.

Which of the statements given above is/are correct?

1. 1 and 2 only
2. 2 and 3 only
3. 3 only
4. 1, 2 and 3

Correct Answer : 3

Explanation

- Eluviation is the transport of soil material from upper layers of soil to lower levels by downward precipitation of water. **Hence, statement 1 is not correct.**
 - Accumulation of soil material from upper layers of soil to lower levels is called Illuviation. **Hence, statement 2 is also not correct.**
 - In dry climates, because of high temperature, evaporation exceeds precipitation and hence ground water is brought up to the surface by capillary action and in the process the water evaporates leaving behind salts in the soil. Such salts form into a crust in the soil known as hardpans. **Hence, statement 3 is correct and option (c) is the correct answer.**
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Question 14:

Consider the following statements regarding soils of tundra region:

1. They are characterised by high bacterial activity.
2. They show deeper soil profiles (deeper soil horizons).

Which of the statements given above is/are correct.

1. 1 only
2. 2 only
3. Both 1 and 2
4. Neither 1 nor 2

Correct Answer : 4

Explanation

- Intensity of bacterial activity shows up differences between soils of cold and warm climates. **Humus accumulates in cold climates as bacterial growth is slow.** Therefore, soils of these regions are characterised by low bacterial activity due to which layers of peat develop in these regions. **Hence, statement 1 is incorrect.**
 - Soils of Tundra regions contain largely mechanically broken materials whereas tropical soils show deeper profiles. **Hence, statement 2 is also incorrect and option (d) is the correct answer.**
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