

Chapter 5

Geomorphic Processes

Very Short Answer Type Questions

1.What kind of changes are brought by internal forces?

Answer:

Internal forces give birth to new landforms on the earth.

2.What is done by external forces?

Answer:

External forces bring changes in existing landforms on the earth. Through erosion and deposition, they keep bringing changes in topography of the earth.

3.What are geomorphic processes?

Answer:

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.

4.What is weathering?

Answer:

Weathering is defined as mechanical disintegration and chemical decomposition of rocks through the actions of various elements of weather and climate.

5.What is denudation?

Answer:

The term ‘denude’ means to strip off or to uncover. Weathering, mass wasting/movements, erosion and transportation are included in denudation.

6.How do weathering activities work?

Answer:

A group of weathering processes viz; solution, carbonation, hydration, oxidation and reduction act on the rocks to decompose, dissolve or reduce them to a fine clastic state through chemical reactions by oxygen, surface and/or soil water and other acids.

7.What are different types of weathering activities?

Answer:

There are three major groups of weathering processes :

1. chemical;
2. physical or mechanical;
3. biological weathering processes.

8. How can you classify mass movements?

Answer:

Mass movements are of three types:

1. slow movement
2. rapid movement and
3. landslides.

9.What are different types of movement?

Answer:

Heave (heaving up of soils due to frost growth and other causes), flow and slide are three important types of movements.

10.What do you mean by reduction?

Answer:

When oxidised minerals are placed in an environment where oxygen is absent, reduction takes place.

11. Physical weathering depends on some applied forces. What are these?

Answer:

Physical or mechanical weathering processes depend on some applied forces. The applied forces could be:

- gravitational forces such as overburden pressure, load and shearing stress;
- expansion forces due to temperature changes, crystal growth or animal activity;
- water pressures controlled by wetting and drying cycles.

12. Where does oxidation occur? Which minerals get affected by oxidation?

Answer:

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.

13. What are the climatic factors involved in the formation of soil?

Answer:

The climatic elements involved in soil development are :

- moisture in terms of its intensity, frequency and duration of precipitation - evaporation and humidity;
- temperature in terms of seasonal and diurnal variations.

14. What are geomorphic agents?

Answer:

An agent is a mobile medium (like running water, moving ice masses, wind, waves and currents, etc.) which removes, transports and deposits earth materials. Running water, groundwater, glaciers, wind, waves and currents, etc., can be called geomorphic agents.

15.What do you mean by stress?

Answer:

Gravitational force acts upon all earth materials having a sloping surface and tend to produce movement of matter in down slope direction. Force applied per unit area is called stress.

16.Why is weathering of rocks important for economy?

Answer:

Weathering of rocks and deposits is important for the economy because it 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.

17.What are tors?

Answer:

In rocks like granites, smooth surfaced and rounded small to big boulders form due to such exfoliation. It is called tors.

18.When does frost weathering takes place?

Answer:

Frost weathering occurs due to growth of ice within pores and cracks of rocks during repeated cycles of freezing and melting.

19.What is enrichment?

Answer:

When rocks undergo weathering, some materials are removed through chemical or physical leaching by groundwater and thereby the concentration of valuable materials increases. It makes the concentration of the same valuable material sufficient and economically viable to be exploited, processed and refined. This is called enrichment.

20.What factors are helpful in mass movement?

Answer:

Weak unconsolidated materials, thinly bedded rocks, faults, steeply dipping beds, vertical cliffs or steep slopes, abundant precipitation and torrential rains and scarcity of vegetation etc., favour mass movements.

21 .What do you mean by mudflow?

Answer:

In the absence of vegetation cover and with heavy rainfall, thick layers of weathered materials get saturated with water and either slowly or rapidly flow down along definite channels. It looks like a stream of mud within a valley.

22.What is soil erosion?

Answer:

Erosion involves acquisition and transportation of rock debris. The erosion can be defined as “application of the kinetic energy associated with the agent to the surface of the land along which it moves”. Kinetic energy is computed as $KE = \frac{1}{2}mv^2$ where ‘m’ is the mass and ‘v’ is the velocity. If erosion takes place with soil, it is called soil erosion.

23.Define Gradation?

Answer:

The phenomenon of wearing down of relief variation of the surface of the earth through erosion is known as gradation.

24.What is meant by geomorphic process?

Answer:

The endogenic and exogenic forces causing physical stresses and chemical actions on earth material and bringing about changes in the configuration of the surface of the earth is known as geomorphic process.

25.What are geomorphic agents? Give examples?

Answer:

Any exogenic elements of nature (like water, ice, wind, etc.) capable of acquiring and transporting earth materials-can be called geomorphic agents. An agent is a mobile medium (like running water, moving ice, etc.) which removes, transports and deposits earth materials. Examples: Running water, glacier, wind waves and currents, etc. can be called geomorphic agents.

26.What is meant by diastrophism?

Answer:

All processes that move elevate or built up portion of the earth's crust come under diastrophism.

27.What do the word volcanism and volcano indicate?

Answer:

Volcanism includes the movement of molten rock onto or towards the earth's surface and also form formation of many intrusive and extrusive forms.

Short Answer Type Questions

1.What factors have caused diastrophism?

Answer:

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

- Orogenic processes: It involves mountain building through severe folding and affecting long and narrow belts of the earth's crust;
- Epeirogenic processes: It involves uplift or warping of large parts of the earth's crust;
- Earthquakes: It involves local relatively minor movements;
- Plate tectonics: It involves horizontal movements of crustal plates. All these processes-cause pressure, volume and temperature (PVT) changes which in turn induce metamorphism of rocks.

2.Why is the surface of the earth uneven?

Answer:

The difference in the internal forces operation from within the earth which built up the crust have been responsible for the variations in the outer surface of the crust. Due to variations in geothermal gradients and strength, the actions of endogenic forces are not uniform and hence the tectonically controlled original crystal surface is uneven.

3.What factors activate the process of mass movement?

Answer:

Following factors activate the process of mass movement.

- Removal of support from below to materials above through natural or artificial means;
- Increase in gradient and height of slopes;
- Overloading through addition of materials naturally or by artificial filling;
- Overloading due to heavy rainfall, saturation and lubrication of slope materials;
- Removal of material or load from over the original slope surfaces;

- Occurrence of earthquakes, explosions or machinery;
- Excessive natural seepage;
- Heavy drawdown of water from lakes, reservoirs and rivers leading to slow outflow of water from under the slopes or river banks;
- Indiscriminate removal of natural vegetation.

4.How does biological weathering take place?

Answer:

Biological weathering takes place by:

- **Animals:** Animals like rabbits, rats, termites, etc. make burrows and holes in the rocks. They consume large quantity of soils and rocks for making their habitat and destruction of food. This loosens the rock strata and disintegration occurs.
- **Vegetation:** Long and tenacious roots of plants work down into cracks of rocks. The roots of shrubs and trees reach deep into them and this lodge large blocks.
- **Human Activities:** Mining, deforestation, indiscriminate cultivation of land and construction activities contribute to weathering.

5.Deposition is the result of erosion. Explain.

Answer:

Deposition is a consequence of erosion. The erosional agents lose their velocity and hence energy on gentler slopes and the materials carried by them start to settle themselves. In other words, deposition is not actually the work of any agent. The coarser materials get deposited first and finer ones later. By deposition depressions get filled up. The same erosional agents viz., running water, glaciers, wind, waves and groundwater act as aggradational or depositional agents also.

6. Without gravity and gradient will there be no erosion?

Answer:

Gravity besides being a directional force activates down slope movement of matters and also causes stresses on earth material.

- Without gravity and gradients there would be no mobility and hence no erosion, no transportation and no deposits as gravitation stresses are as important as the other geomorphic process.
- Gravity is force that is keeping us in contact with the surface and it is the force that switches on the movement of all surface material on earth.
- All the movement either within the earth or on the surface of the earth occurs due to gradients from higher levels to lower levels and from high pressure to low pressure areas.

7. What is the importance of weathering?

Answer:

Importance of weathering:

- 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 movement. Biomes and bio-diversity is basically a result of forests depend upon the depth of weathering mantles.
- Weathering aids mass and deposits helps in the enrichment and concentrations of certain valuables ores of iron, manganese, aluminium, etc. which are of great importance for the national economy.
- Weathering is an important process in the formation of soils.

8. Mention the factors which results in mass movement.

Answer:

- The movements of mass may range from slow to rapid, affecting shallow to deep columns of materials and include creep, flow, slide and fall. Gravity exerts its force on all matter, both bedrock and the products of weathering. So, weathering is not a pre- requisite for mass movement though it aids mass movement.

- Weak unconsolidated materials dipping thinly bedded rocks, faults, steeply, beds, vertical cliffs or steep slopes, abundant precipitation and torrential rains and scarcity of vegetation etc. favour mass movements.

9.Explain the mass movements which are slow.

Answer:

- **Soil creep:** It is one type under this category which can occur on moderately steep, soil covered slope. We may find some of evidence of extremely, slow down slope movement of soil.
- **Rock creep:** The disintegrated rock material creeps down the slope under the influence of gravity.
- **Solifluction:** It takes place in cold areas where there is heavy snowfall in winter. It involves slow downslope flowing soil mass or fine grained rock debris saturated or lubricated with water.

10.Why are parent material and time considered as passive control factors in soil formation?

Answer:

1. Parent Material: It is a passive factor in soil formation. Parent materials can be any insitu or on-site weathered rock debris or transported deposits. Soil formation depends upon the texture, structure as well as mineral and chemical composition of the rock debris/ deposits.

2. Time: It is the passive controlling factor in soil formation. The length of time the soil-forming processes operate determine maturation of soils and profile development. A soil becomes mature when all soil-forming processes act for a sufficiently long time developing a profile.

11. Write the difference between:

(i) Exogenic and endogenic forces

(ii) Orogenic movements and epeirogenic movements

(iii) Physical weathering and chemical weathering.

Answer: (i)

S.no.	Exogenic Forces	Endogenic Forces
1.	The external forces are known as Exogenic forces.	The internal forces are known as Endogenic forces.
2.	Solar energy is the sole driving force behind all the Exogenic processes. E.g. Erosion, Flood, Mining, etc.	Gravity is the sole driving force behind all the Endogenic process. E.g. Earthquake, Volcanic Eruption, etc.

(ii)

S.no.	Orogenic Movements	Epeirogenic Movements
1.	In the process of Orogenic the crust is severely deformed into folds.	Due to Epeirogenic they may be single deformation.

Geography

2.	It is mountain building process.	It is continental building process.
3.	It affects long and narrow belt of earth's crust.	It involves uplift or wrapping of large parts of earth's crust.

(iii)

S.no.	Physical Weathering	Chemical Weathering
1.	Physical force disintegrates the rocks.	Rocks are decomposed by chemical changes.
2.	No chemical change occurs.	Not much physical change occurs but chemical change occurs due to air and water.
3.	More effective in dry and cold areas.	Effective in hot and humid areas.
4.	Insulation, frost and pressure are the agents.	Oxidation and reduction, carbonation, hydration and soil are the agents.
5.	Rocks are affected at the greater depth.	Rocks are affected on the surface only.

6.	Even the strong minerals are affected by physical weathering.	Chemical resistance minerals are not affected.
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12.It is weathering that is responsible for bio-diversity on the earth. How?

Answer:

Weathering processes lead to 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. Bio-diversity is basically a result of forests and vegetation. Forests and vegetation depend upon the depth of weathering mantles. Erosion cannot be significant if the rocks are not weathered. It implies that weathering aids mass wasting, erosion and reduction of relief and changes in landforms are a consequence of erosion.

13.What are mass movements that are real rapid and perceptible? List

Answer:

These movements transfer the mass of rock debris down the slopes under the direct influence of gravity. That means, air, water or ice do not carry debris with them from place to place but on the other hand the debris may carry with it air, water or ice.

Mass movements can be slow or rapid. Rapid movements are mostly prevalent in humid climatic regions and occur over gentle to steep slopes. When slopes are steeper, even the bedrock especially of soft sedimentary rocks like shale or deeply weathered igneous rock may slide downslope.

14.What are the various mobile and mighty exogenic geomorphic agents and what is the prime job they perform?

Answer:

The exogenic processes derive their energy from atmosphere determined by the ultimate energy from the sun and also the gradients created by tectonic factors. All the exogenic geomorphic processes are covered under a general term, denudation. The word 'denude' means to strip off or to uncover. As there are different climatic regions on the earth's surface, the exogenic geomorphic processes vary from region to region. Temperature and precipitation are the two important climatic elements that control various processes.

Their prime job includes weathering, mass wasting/movements, erosion and transportation.

15.Is weathering essential as a pre-requisite in the formation of soils? Why?

Answer:

Yes, weathering is an essential pre-requisite in the formation of soils. Weathering is action of elements of weather and climate over earth materials. There are a number of processes within weathering which act either individually or together to affect the earth materials in order to reduce them to fragmental state. Weathering is mechanical disintegration and chemical decomposition of rocks through the actions of various elements of weather and climate.

Weathering is an important process in the formation of soils. When rocks undergo weathering, rocks start to break up and take form of soil gradually.

Long Answer Type Questions

1.What are different types of mass movements?

Answer:

There are three types of mass movements: Slow Movements: Creep is one type under this category which can occur on moderately steep, soil covered slopes. Movement of materials is extremely slow and imperceptible except through extended observation. Materials involved can be soil or rock debris. Soil creep, talus creep, rock creep, rock- glacier creep etc can be identified. It also includes 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. When the upper portions get saturated and when the lower parts are impervious to water percolation, flowing occurs in the upper parts.

Rapid Movements: These movements are mostly prevalent in humid climate regions and occur over gentle to steep slopes. Movements of water- saturated clayey or silty earth materials down low angle terraces or hill slides is known as earth flow. When slopes are steeper over the bedrock especially of soft sedimentary rocks like shale or deeply weathering igneous rock may slide downslope. With heavy rainfall, thick layers of weathered materials get saturated with water and either slowly or rapidly flow down along definite channels. It looks like a stream of mud within a valley.

Landslides: The types of landslides.

- Slumps: The slipping of one or several units of rock debris with a backward rotation with respect to the slope over which the movement takes place.
- Debris slide: rapid rolling or sliding of earth debris without backward rotation of mass is known as Debris slide.
- Rockslide: Sliding of individual rock masses down bedding, joint or fault surface is rockslide.

- **Rock fall:** Rock fall is free falling of rock blocks over any steep slope keeping itself away from the slope. Rock falls occurs from the superficial layers of the rock face.

2.Explain different types of chemical weathering.

Answer:

Different types of chemical weathering includes:

1. Oxidation and Reduction: Oxidation is the effect of oxygen in air and water on the rocks. The atmospheric oxygen in rainwater unites with minerals in rocks specially with iron compounds. When oxidised minerals are placed in an environment where oxygen is absent, reduction takes place. It exists normally below water table, in area of stagnant water in more hot and humid climates.

2. Carbonation: When the carbon dioxide in atmosphere dissolves in water it form carbonic acid that affects the rocks, it is carbonation. It has acidic affect and dissolves calcium carbonates and magnesium carbonates such as gypsum, marble, limestone.

3. Hydration: When the hydrogen of water dissolves in rocks hydration occurs. Certain minerals in rocks increase their volume and become heavy when observe water contains hydrogen. They break due to its increased pressure and the colour also changes.

4. Solution: Rainwater is able to dissolve certain minerals and leaching of the soil occurs. Normally solids are also removed during leaching. For e.g.: gypsum, rock salt, etc. undergo solution.

3.Explain different types of physical weathering.

Answer:

Different types of physical weathering includes:

- **Exfoliation:** Due to differential heating and resulting expansion and contraction of surface layers and their subsequent exfoliation from the surface

results in smooth rounded surfaces in rocks. In rocks like granites, smooth surfaced and rounded small to big boulders called tors form due to such exfoliation.

- Frost: It is an active agent in cold climatic regions in high altitudes and the cracks are filled with water during the day time, this water is frozen at night when temperature falls below freezing point.
- Pressure: Many igneous and metamorphic rocks crystallize deep in the interior under the combine influence of high pressure and temperature. The salt near surface pores cause splitting of the grains within the rocks which eventually falls off, this result into granules disintegration.

4.Explain about erosion and deposition.

Answer:

Erosion involves acquisition and transportation of rock debris. When massive rocks break into smaller fragments through weathering and any other process, erosional geomorphic agents like running water, groundwater, glaciers, wind and waves remove and transport it to other places depending upon the dynamics of each of these agents. Abrasion by rock debris carried by these geomorphic agents also aids greatly in erosion. By erosion, relief degrades, i.e., the landscape is worn down. Weathering aids erosion it is not a pre-condition for erosion to take place. Weathering, mass-wasting and erosion are degradational processes. It erosion that is largely responsible for continuous changes that the earth's surface is undergoing. The erosion and transportation of earth materials is brought about by wind, running water, glaciers, waves and ground water.

Deposition is a consequence of erosion. The erosional agents loose their velocity and hence energy on gentler slopes and the materials carried by them start to settle themselves. In other words, deposition is not actually the work of any agent. The coarser materials get deposited first and finer ones later. By deposition depressions get filled up. The same erosional agents viz., running water, glaciers, wind, waves and groundwater act as aggradational or depositional agents also. What happens to the surface of the earth due to erosion and deposition is elaborated in the next chapter on landforms and their evolution. There is a shift of materials in mass movements as well as in erosion from one place to the other.

5. “Our earth is a playfield for two opposing groups of geomorphic processes.” Discuss.

Answer:

It is absolutely right to say that our earth is playfield for two opposing groups of forces. These forces are exogenic and endogenic. The external forces are known as exogenic forces and the internal forces are known as endogenic forces. The differences in the internal forces operating from within the earth which built up the crust have been responsible for the variations in the outer surface of the crust. The earth's surface is being continuously subjected to external forces induced basically by energy (sunlight). Of course, the internal forces are still active though with different intensities. That means, the earth's surface is being continuously subjected to by external forces originating within the earth's atmosphere and by internal forces from within the earth.

The actions of exogenic forces result in wearing down (degradation) of relief/elevations and filling up (aggradation) of basins/ depressions, on the earth's surface. The endogenic forces continuously elevate or build up parts of the earth's surface and hence the exogenic processes fail to even out the relief variations of the surface of the earth. So, variations remain as long as the opposing actions of exogenic and endogenic forces continue. In general terms, the endogenic forces are mainly land building forces and the exogenic processes are mainly land wearing forces.

6. Exogenic geomorphic processes derive their ultimate energy from the sun's heat. Explain.

Answer:

The exogenic processes derive their energy from atmosphere determined by the ultimate energy from the sun and also the gradients created by tectonic factors. Various minerals in rocks possess their own limits of expansion and contraction. With rise in temperature, every mineral expands and pushes against its neighbour and as temperature falls, a corresponding contraction takes place. Because of diurnal changes is the cause of splitting of individual grains within rocks, which eventually fall off. This process of falling off of individual grains may result in

granular disintegration or granular foliation. Salt crystallisation is most effective of all salt-weathering processes. In areas with alternating wetting and drying conditions salt crystal growth is favoured and the neighbouring grains are pushed aside. Sodium chloride and gypsum crystals in desert areas heave up overlying layers of materials and with the result polygonal cracks develop all over the heaved surface. With salt crystal growth, chalk breaks down most readily, followed by limestone, sandstone, shale, gneiss and granite, etc.

**7.Are physical and chemical weathering processes independent of each other?
If not, why? Explain with examples.**

Answer:

No, physical and chemical weathering are not independent of each other. They are different but still interdependent. Physical or mechanical weathering processes depend on some applied forces. The applied forces could be: (a) gravitational forces such as overburden pressure, load and shearing stress; (b) expansion forces due to temperature changes, crystal growth or animal activity; (c) water pressures controlled by wetting and drying cycles. Chemical weathering depends on a group of weathering processes viz; solution, carbonation, hydration, oxidation and reduction act on the rocks to decompose, dissolve or reduce them to a fine clastic state through chemical reactions by oxygen, surface and/or soil water and other acids. Water and air (oxygen and carbon dioxide) along with heat must be present to speed up all chemical reactions. Over and above the carbon dioxide present in the air, decomposition of plants and animals increases the quantity of carbon dioxide underground. These chemical reactions on various minerals are very much similar to the chemical reactions in a laboratory.

These forces are interdependent. For example availability of water and heat depends on physical factors while chemical reactions depend on availability of water and heat.

8.How do you distinguish between the process of soil formation and soil-forming factors? What is the role of climate and biological activity as two important control factors in the formation of soils?

Answer:

Process refers to step by step procedure or methodical ways in which soil comes into existence while factors causing this formation are called soil forming factors. Soil formation process: Soil formation is called pedogenesis. It depends on weathering the most. It is this weathering mantle which is the basic input for soil to form. The weathered material or transported deposits are colonised by bacteria and other inferior plant bodies like mosses and lichens. Several minor organisms may take shelter within the mantle and deposits. The dead remains of organisms and plants help in humus accumulation. Minor grasses and ferns may grow; later, bushes and trees will start growing through seeds brought in by birds and wind. Plant roots penetrate down, burrowing animals bring up particles, mass of material becomes porous and sponge- like with a capacity to retain water and to permit the passage of air and finally a mature soil, a complex mixture of mineral and organic products forms.

Soil-forming factors: Five basic factors control the formation of soils:

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

In fact, soil forming factors act in union and affect the action of one another.

Climate: Climate is an important active factor in soil formation. The climatic elements involved in soil development are :

1. moisture and
2. temperature.

Precipitation gives soil its moisture content which makes the chemical and biological activities possible. Excess of water helps in the downward transportation of soil components through the soil (eluviation) and deposits the same down below (illuviation). Temperature acts in two ways — increasing or reducing chemical and biological activity. Chemical activity is increased in higher temperatures, reduced in cooler temperatures (with an exception of carbonation) and stops in freezing conditions. That is why, tropical soils with higher temperatures show deeper profiles and in the frozen tundra regions soils contain largely mechanically broken materials.

Biological Activity: The vegetative cover and organisms that occupy the parent materials from the beginning and also at later stages help in adding organic matter, moisture retention, nitrogen, etc. Dead plants provide humus. Some organic acids which form during humification aid in decomposing the minerals of the soil parent materials. Intensity of bacterial activity shows up differences between soils of cold and warm climates. Humus accumulates in cold climates as bacterial growth is slow.

With undecomposed organic matter because of low bacterial activity, layers of peat develop in sub-arctic and tundra climates. Rhizobium, a type of bacteria, lives in the root nodules of leguminous plants and fixes nitrogen beneficial to the host plant. The influence of large animals like ants, termites, earthworms, rodents etc., is mechanical, but, it is nevertheless important in soil formation as they rework the soil up and down. In case of earthworms, as they feed on soil, the texture and chemistry of the soil that comes out of their body changes.

9. Is it essential to distinguish between geomorphic agents and geomorphic processes? If yes, explain the difference.

Answer:

Yes, it is essential to distinguish between geomorphic agents and geomorphic processes because former is the cause and latter is the stepwise process.

- Geomorphic agent: An agent is a mobile medium (like running water, moving ice masses, wind, waves and currents, etc.) which removes, transports and

deposits earth materials. Running water, groundwater, glaciers, wind, waves and currents, etc., can be called geomorphic agents.

- Geomorphic Processes: The Endogenic and Exogenic forces causing physical stresses and chemical actions on earth material and bringing about changes in the configuration of the surface of the earth is known as Geomorphic Process.

10.What is the sole driving force behind all the exogenic processes? Explain how?

Answer:

Solar energy is the sole driving force behind all exogenic processes. Exogenic processes derive their energy from atmosphere determined by the ultimate energy from the sun and also the gradients created by tectonic factors.

1. Various minerals in rocks possess their own limits of expansion and contraction.
2. With rise in temperature, every mineral expands and pushes against its neighbour and as temperature falls, a corresponding contraction takes place. Because of diurnal changes in the cause splitting of individual grains within rocks, which eventually fall off. This process of falling off of individual grains may result in granular disintegration or granular foliation. Salt crystallisation is most effective of all salt-weathering processes.
3. In areas with alternating wetting and drying conditions salt crystal growth is favoured and the neighbouring grains are pushed aside. Sodium chloride and gypsum crystals in desert areas heave up overlying layers of materials and with the result polygonal cracks develop all over the heaved surface. With salt crystal growth, chalk breaks down most readily, followed by limestone, sandstone, shale, gneiss and granite etc.

11. Do you think that slopes or gradients are created by tectonic forces? Why?

Answer:

Yes, I think that slopes or gradients are created by tectonic forces. Those areas where there is excessive magma formation, have higher slopes and they have emerged as mountains. The strength of gradients also determine the type of landforms.

12. “All corners of the earth do not have same slope”. Why?

Answer:

The difference in the operation of the internal forces from within i.e. earth which built up the crust have been responsible for the variations in the outer surface of the crust. Due to variations in geothermal gradients and strength, the actions of Endogenic forces are not uniform and hence the tectonically controlled original crystal surface is uneven.

13. Time and parent material play a passive role in soil formation. Do you agree? Justify.

Answer:

Yes, I agree.

- Time: It is the passive controlling factor in soil formation. The length of time the soil forming processes operate determine maturation of soils and profile development.
- Parent Material: It is a passive factor in soil formation. Parent material can be moved or transported debris. Soil formation depends upon the texture, structure as well as mineral and chemical composition of the rock debris/deposits.

1. Multiple choice questions

1.Which of the following is a type of mass movement?

- (a) Slow movements
- (b) Rapid movements
- (c) Landslides
- (d) All of the above.

Answer:

- (d) All of the above.

2.Which of the following is not a cause of soil erosion?

- (a) Rock Material
- (b) Landform
- (c) Climate
- (d) Deposition.

Answer:

- (d) Deposition

3.Which of the following is a form of weathering?

- (a) Physical
- (b) Chemical
- (c) Biological
- (d) All of the above.

Answer:

- (d) All of the above

4.What term is used for the reaction of carbonate and bicarbonate with minerals?

- (a) Carbonate
- (b) Carbonation
- (c) Carbolic
- (d) All of the above.

Answer:

- (b) Carbonation

5. Weathering is important for:

- (a) Air
- (b) National economy
- (c) Climate
- (d) Earth.

Answer:

- (6) National economy

6. Which type of weathering occurs due to growth of ice within pores and cracks of rocks during repeated cycles of freezing and melting?

- (a) Frost weathering
- (b) Landslides
- (c) Water weathering
- (d) Crystallisation.

Answer:

- (a) Frost weathering

7. Which of the following is an example of endogenic forces?

- (a) Erosion
- (b) Volcanism
- (c) Weathering
- (d) Balance.

Answer:

- (b) Volcanism

8. Which of the following is not associated with diastrophism?

- (a) Orogenic processes
- (b) Epeirogenic processes
- (c) Plate tectonics
- (d) Balance.

Answer:

- (d) Balance

9. Which of the following is a systematic process?

- (a) Weathering
- (b) Diastrophism
- (c) Volcanism
- (d) Balanced erosion.

Answer:

- (d) Balanced erosion

10. What are geomorphic causes of erosion?

- (a) Flowing water
- (b) Underground water
- (c) Air
- (d) All of the above.

Answer:

- (d) All of the above

11. Which of the following process is not associated with physical weathering?

- (a) Frost wedging
- (b) Expansion
- (c) Carbonation
- (d) Thawing.

Answer:

- (c) Carbonation

12. All earth materials having a sloping surface and tend to produce movement of matter in down slope direction. It is called:

- (a) Soil erosion
- (b) Landslides
- (c) Volcanism
- (d) Slump.

Answer:

- (a) Soil erosion

13. Which of the following is affected by hydration?

- (a) Granite
- (b) Soil
- (c) Quartz
- (d) Rocks.

Answer:

- (b) Soil

14. Where does oxidation take place?

- (a) Where there is ready access to the atmosphere and oxygenated waters.
- (b) Where there are plants.
- (c) Where there is moisture in air.
- (d) In mountainous regions.

Answer:

- (a) where there is ready access to the atmosphere and oxygenated waters.

15. Which one of the following processes is a gradational process?

- (a) Deposition
- (b) Diastrophism
- (c) Volcanism
- (d) Erosion.

Answer:

- (d) Erosion

16. Which one of the following materials is affected by hydration process?

- (a) Granite
- (b) Clay
- (c) Quartz
- (d) Salts.

Answer:

- (d) Salts

17. Debris avalanche can be included in the category of:

- (a) Landslides
- (b) Slow flow mass movements'
- (c) Rapid flow mass movements
- (d) Subsidence.

Answer:

- (c) Rapid flow mass movements.