Q.1) Consider the following statements:

1. The point within the earth where an earthquake rupture starts is called hypocenter.
2. Love waves are transverse in nature.
3. Rayleigh wave is the slowest of all the seismic waves.

Which of the above statements are correct?

a) 1 and 2 only
b) 2 and 3 only
c) 1 and 3 only
d) 1, 2 and 3

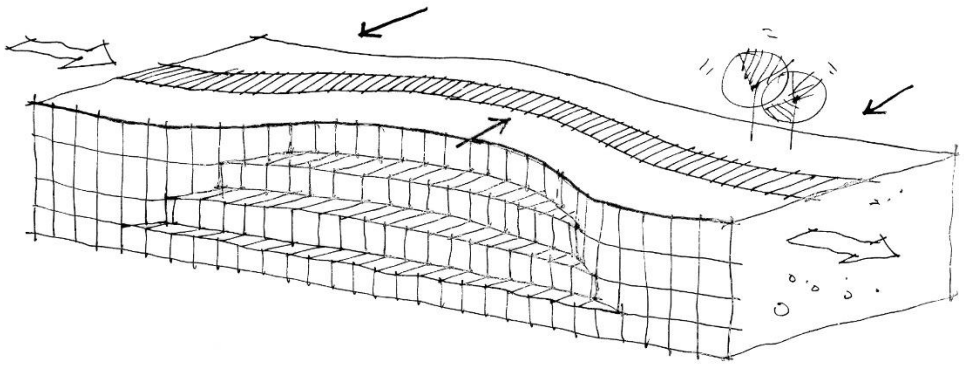
Q.1) Solution (d)

Basic Information:

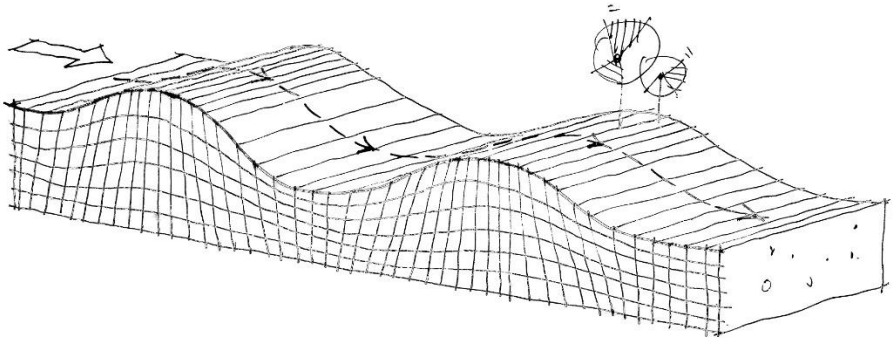
Surface waves: These waves travel through the surface of the earth. Due to their amplitude, they are most destructive waves causing extensive damage on the surface of the earth.

Types of Surface Waves:

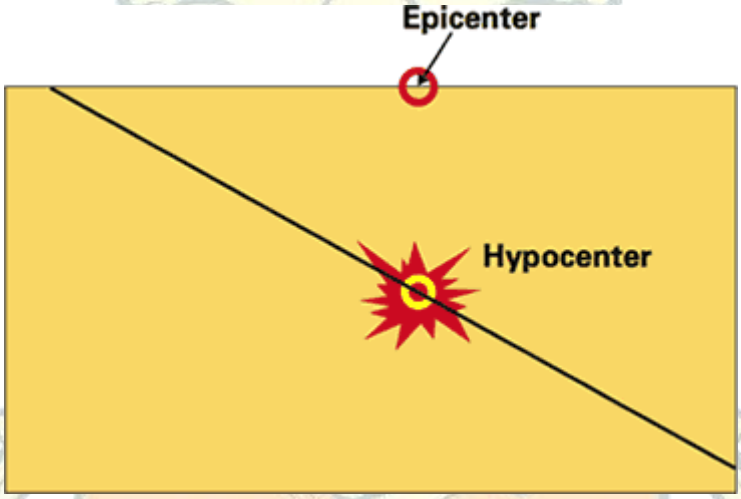
Love waves (L-waves) - its fastest surface waves and move on ground side to side. It is confined to surface of the crust love wave is wounded by Seismograph.



Rayleigh waves- Rayleigh waves rolls along the ground just like a wave roll across a lake or an ocean.



The hypocenter is the point within the earth where an earthquake rupture starts. The epicenter is the point directly above it at the surface of the Earth. Also commonly termed the focus. See also epicentre.



Statement Analysis:

Statement 1	Statement 2	Statement 3
Correct	**Correct**	**Correct**
The point within the earth where an earthquake rupture starts is called	Rayleigh wave and Love wave are transverse waves.	Rayleigh wave is the slowest of all the seismic waves.

hypocenter. In seismology, it is a synonym of the **focus**.		Rayleigh waves are slower than body waves and typically travel at a speed that is 10% slower than S-waves. Rayleigh waves propagate through the ground as ripples.

Q.2) Consider the following statements:

1. Acid rocks have high content of silica.
2. Basic rocks are poor in silica, hence the parent material of such rocks cools slowly and thus, flows and spreads far away.

Which of the above statements is/are NOT correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 and 2

Q.2) Solution (d)

Note: Incorrect statements are asked in the question.

Basic Information:

Acid Rocks:

- These are characterized by high content of silica, up to 80 per cent, while the rest is divided among aluminum, alkalis, magnesium, iron oxide, lime etc.
- These rocks constitute the SiAl portion of the crust.
- Due to the excess of silicon, acidic magma cools fast and it does not flow and spread far away.
- High mountains are formed of this type of rock.

- These rocks have a lesser content of heavier minerals like iron and magnesium and normally contain quartz and feldspar.
- Add rocks are hard, compact, massive and resistant to weathering.

Basic Rocks:

- These rocks are poor in silica (about 40 per cent); magnesia content is up to 40 per cent and the remaining 40 per cent is spread over iron oxide, lime, aluminum, alkalis, potassium etc.
- Due to low silica content, the parent material of such rocks cools slowly and thus, flows and spreads far away.
- This flow and cooling gives rise to plateaus. Presence of heavy elements imparts to these rocks a dark colour.
- Basalt is a typical example, others being gabbro and dolerite. Not being very hard, these rocks are weathered relatively easily.

Statement Analysis:

Statement 1	Statement 2
Correct	**Correct**
Acid rocks have high content of silica. These are characterized by **high content of silica, up to 80 per cent,** while the rest is divided among aluminum, alkalis, magnesium, iron oxide, lime etc.	Due to low silica content, the parent material of such rocks cools slowly and thus, flows and spreads far away. This flow and cooling gives rise to plateaus or **shield volcanoes**.

Q.3) With reference to Geomagnetism, consider the following statements:

1. The Earth has more than two magnetic poles.
2. Agonic line is an imaginary line connecting the points of same angle of declination.
3. Geomagnetic dipole does not coincide with the Earth's axis of rotation rather it is parallel to it.

4. Presently, South Magnetic pole is located in Northern Canada.

Which of the statements given above is/are correct?

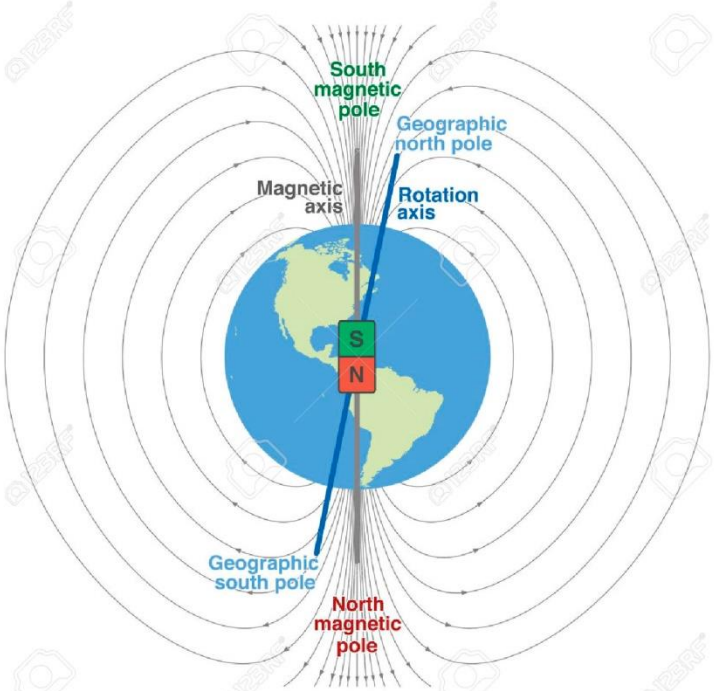
a) 3 and 4 only
b) 1 only
c) 1 and 4 only
d) 2, 3 and 4 only

Q.3) Solution (c)

Basic Information:

Geomagnetism (also known as **terrestrial magnetism**) is the scientific study of the earth from the point of view of its magnetic properties.

The Earth acts like a **large spherical magnet**. It is surrounded by a **magnetic field** that changes with time and location. The field is generated by a **dipole magnet** (i.e., a straight magnet with a North and South Pole) located at the centre of the Earth. The axis of the dipole is offset from the axis of the Earth's rotation by approximately **11 degrees**. This means that the north and south geographic poles and the north and south magnetic poles are not located in the same place. At any point and time, the Earth's magnetic field is characterized by a **direction** and **intensity** which can be measured.



Statement Analysis:

Statement 1	Statement 2	Statement 3	Statement 4
Correct	**Incorrect**	**Incorrect**	**Correct**
The Earth has two dominant magnetic poles, and **several very weak 'quadrupolar' poles** of which there are, at least mathematically, about 8 in number. These poles are far weaker than the dipole field and measure only weak departures of the	**Isogonic line** is an imaginary line connecting the points of same angle of declination. **Agonic line** is an imaginary line tracing the zero angle of declination.	Geomagnetic dipole does not coincide with the Earth's axis of rotation rather it is tilted at an angle of about **11 degrees** to Earth's rotational axis.	Presently, South Magnetic pole is located North of Ellesmere Island in Northern Canada. **Note:** Don't get confused with South Magnetic Pole and Geomagnetic South Pole.

local geographic field strength from the basic dipolar North-South field.			The direction are opposite in nature.

Q.4) With reference to Karst landforms, which of the following are depositional features:

1. Travertine
2. Tufa
3. Polje
4. Stalagmite
5. Stalactite
6. Uvala

Select the correct answer using the code given below:

a) 1, 2, 3 and 5 only
b) 1, 2, 4 and 5 only
c) 2, 4, 5 and 6 only
d) 2, 3, 4 and 5 only

Q.4) Solution (b)

Basic Information:

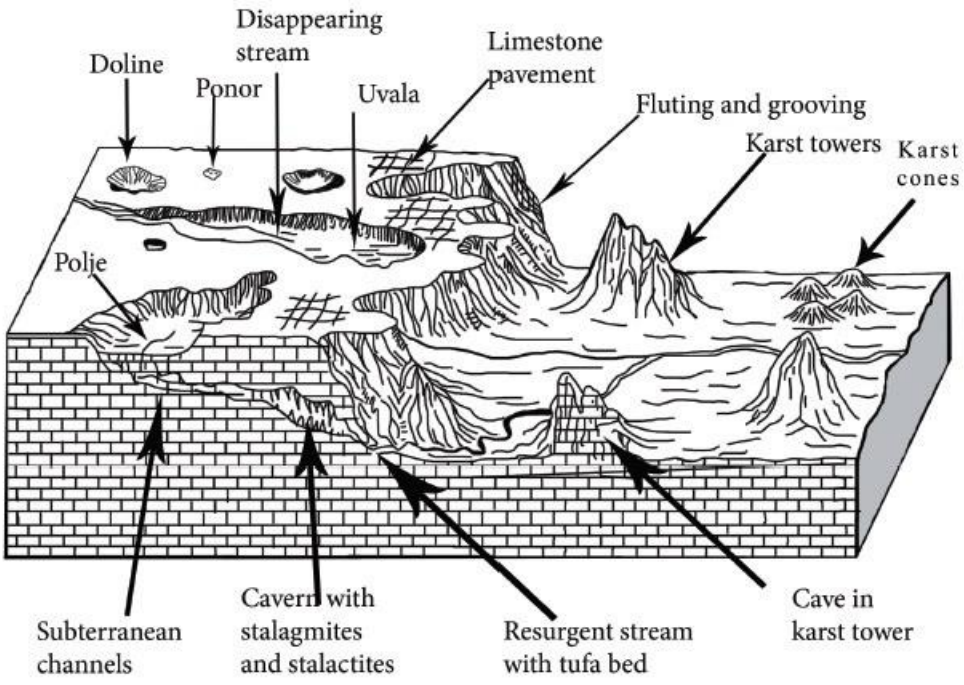
Karst is a topography formed from the dissolution of soluble rocks such as limestone, dolomite, and gypsum. It is characterized by **underground drainage systems** with sinkholes and caves.

It is so named after a province of Yugoslavia on the Adriatic Sea coast where such formations are most noticeable.

Conditions for development of Karst topography:

1. Limestone must be massive, thickly bedded.

2. Limestones should not be porous wherein permeability is largely controlled by joints and not by mass of the limestone. If they are porous then water will pass through the rock mass and the whole rock will become weak and will collapse.
3. The carbonate rocks should be very close to the ground surface so that rainwater may easily and quickly infiltrate into the beds of limestone and may corrode the rocks to form solutional landforms.
4. The limestones should be highly folded, fractured or faulted.
5. There should be enough rainfall so that the required amount of water is available to dissolve carbonate rocks.



Erosional Landforms:

- Sink hole: it is a narrow well like depression formed on the surface due to erosion of limestone. This is a cavity created for the water to seep down.
- Doline: when 2-3 sinkhole combines they form a deeper depression called doline.

- Polje: when doline combine they form a still deeper depresseion called polje. Example: Livno Polje
- Uvala: an extremely large depression caused by collapse of cave.
- Lapies: highly corrugated and rough surface of limestone characterized by low ridges and pinnacles, narrow clefts and numerous solution holes.
- Caves: void of large dimension below the ground surface.

Depositional Landforms:

- Travertine: banded calcareous deposits
- Tufa: softer calcareous deposits at mouth of the cave.
- Helectite: the dripstone growing sideward from stalactite
- Heligmite: the dripstone growing sideward from stalagmite
- Flowstone: sheetlike deposits formed where water flows down the wall or along the floor of a cave.
- Pillar: when stalactite and stalagmite join they form pillar
- Curtain: needle shaped stalactites from the ceiling

Q.5) The gently sloping accumulation of coarse alluvium deposits by a braided stream is known as:

a) Alluvial fan
b) Sand bar
c) Bajada
d) Pediment

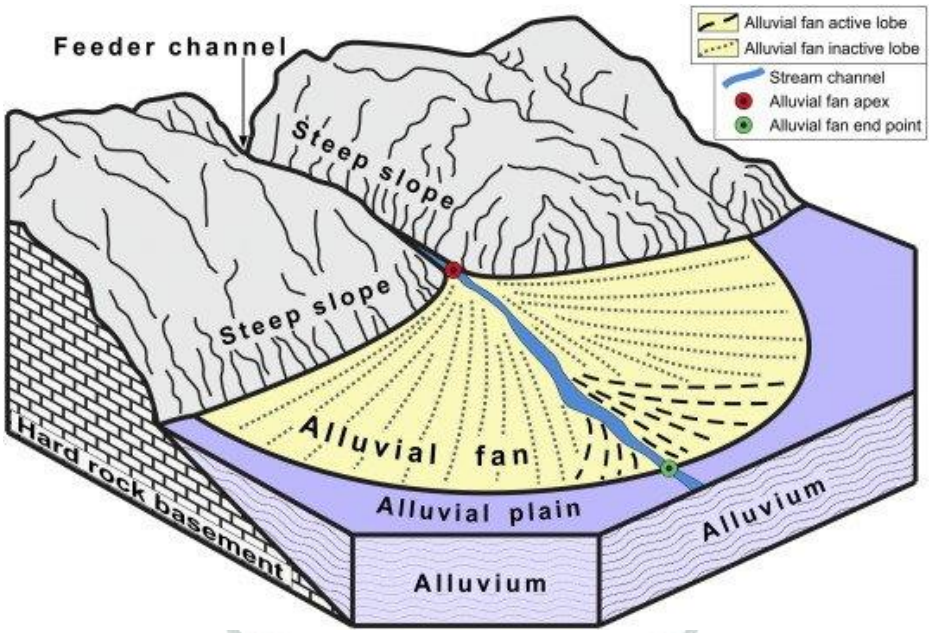
Q.5) Solution (a)

Explanation:

Alluvial Fan:

- An alluvial fan is a cone-shaped depositional landform built up by streams, heavy with sediment load.
- Alluvial fans are formed when streams flowing from mountains break into foot slope plains of low gradient.

- Normally **very coarse load** is carried by streams flowing over mountain slopes. This load gets dumped as it becomes too heavy to be carried over gentler gradients by the streams
- Furthermore, this load spreads as a broad low to a high cone-shaped deposit called an alluvial fan that appears as a series of continuous fans.
- Alluvial fans in humid areas show normally low cones with a gentle slope from head to toe and they appear as high cones with a steep slope in arid and semi-arid climates.



Sand Bar: Sandbar, also called Offshore Bar, submerged or partly exposed ridge of sand or coarse sediment that is built by waves offshore from a beach. The swirling turbulence of waves breaking off a beach excavates a trough in the sandy bottom. Some of this sand is carried forward onto the beach and the rest is deposited on the offshore flank of the trough.

Bajada: it is a landform with gentle and sloping surface, formed between pediment and playa.

Pediment: gently sloping erosional surface that cuts across bedrock and typically has a thin veneer of sediments on its surface.

Q.6) Consider the following discontinuities:

1. Repetti discontinuity
2. Conrad discontinuity

3. Lehmann discontinuity
4. Gutenberg discontinuity
5. Mohorovicic's discontinuity

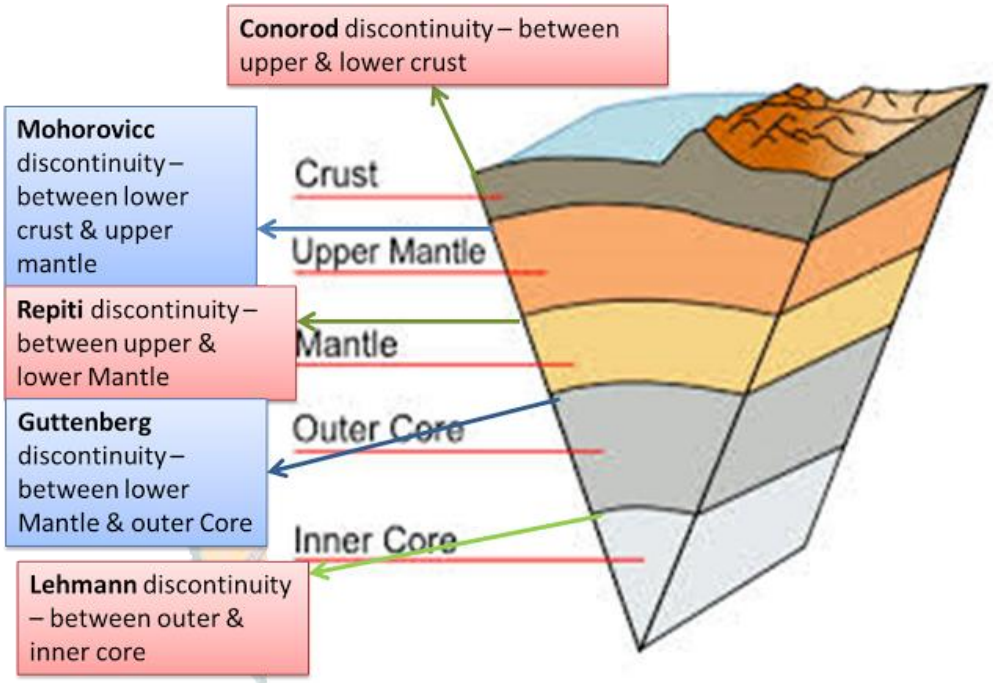
What is the correct order from top to bottom?

a) 1-2-3-4-5
b) 5-2-1-3-4
c) 1-4-2-3-5
d) 2-5-1-4-3

Q.6) Solution (d)

Basic Information:

- **Conrad discontinuity:** The Conrad discontinuity corresponds to the subhorizontal boundary in continental crust at which the seismic wave velocity increases in a discontinuous way. This boundary is observed in various continental regions at a depth of 15 to 20 km, between outer and inner crust however it is not found in oceanic regions.
- **Mohorovicic discontinuity:** The Mohorovicic Discontinuity, or "Moho," is the boundary between the crust and the mantle.
- **Repetti discontinuity:** This discontinuity is found between upper and lower Mantle. This is marked by general decrease in velocity of seismic waves between upper and lower mantle.
- **Gutenberg discontinuity:** The Gutenberg discontinuity occurs within Earth's interior at a depth of about 1,800 mi (2,900 km) below the surface, generally between mantle and core ,where there is an abrupt change in the seismic waves (generated by earthquakes or explosions) that travel through Earth.
- **Lehmann discontinuity:** The Lehmann discontinuity is an abrupt increase of P-wave and S-wave velocities at the depth of 220±30 km, discovered by seismologist Inge Lehmann. It appears beneath continents, but not usually beneath oceans, and does not readily appear in globally averaged studies. It is generally found between outer and inner core.



Q.7) Which of the following characteristics cannot be associated with metamorphic rocks?

1. Recrystallization due to melting and solidifying again
2. Foliation
3. Fossiliferous
4. Banding

Select the correct answer using the code given below:

a) 1 and 4 only
b) 2 and 3 only
c) 1 and 3 only
d) 1, 2 and 4 only

Q.7) Solution (c)

Basic Information:

Metamorphic rocks:

- Metamorphic rocks form under the action of pressure, volume and temperature (PVT) change.

- Metamorphism occurs when rocks are forced down to lower levels by tectonic processes or when molten magma rising through the crust comes in contact with the crustal rocks or the underlying rocks are subjected to great amounts of pressure by overlying rocks. In Metamorphism consolidated rocks undergo recrystallization and reorganization of materials within original rocks. They don't undergo fusion.
- In the process of metamorphism in some rocks grains or minerals get arranged in layers or lines. Such an arrangement of minerals or grains in metamorphic rocks is called foliation or lineation.
- Sometimes minerals or materials of different groups are arranged into alternating thin to thick layers appearing in light and dark shades. Such a structure in metamorphic rocks is called banding and rocks displaying banding are called banded rocks.
- Metamorphic rocks have been put under great pressure, heated, squashed or stretched. So fossils do not usually survive these extreme conditions. Generally, it is only sedimentary rocks that contain fossils.

Statement Analysis:

Statement 1	Statement 2	Statement 3	Statement 4
Incorrect	**Correct**	**Incorrect**	**Correct**
In Metamorphism consolidated rocks undergo recrystallization and reorganization of materials within original rocks due to extreme pressure and temperature conditions. They don't undergo fusion.	In the process of metamorphism in some rocks grains or minerals get arranged in layers or lines. Such an arrangement of minerals or grains in metamorphic rocks is called foliation or lineation.	Metamorphic rocks have been put under great pressure, heated, squashed or stretched. So fossils do not usually survive these extreme conditions.	Sometimes minerals or materials of different groups are arranged into alternating thin to thick layers appearing in light and dark shades. Such a structure in metamorphic rocks is called banding.

Q.8) Consider the following statements regarding the geomorphic process:

1. The source of energy for the exogenetic process is atmosphere whereas, that for the

endogenic process is the Earth herself.
2. Exogenetic forces cause aggradation whereas, the endogenic forces, degradation.
3. Diastrophic forces are classified under exogenetic forces.

Which of the above statements is/are incorrect?

a) 1 only
b) 1 and 2 only
c) 3 only
d) 2 and 3 only

Q.8) Solution (d)

Basic Information:

- Endogenic processes include folding, faulting, warping, volcanism thus, they cause upliftment. The ultimate source of energy behind forces that drive endogenic movements is the Earth's internal heat due to radioactive decay and the gravitation.
- Exogenetic processes include weathering and erosion hence, degradation.
- Both endogenetic and exogenetic forces are needed to shape the landforms on the Earth.
- The exogenetic processes derive their energy from the atmosphere and ultimately from the Sun.

Statement Analysis:

Statement 1	Statement 2	Statement 3
Correct	**Incorrect**	**Incorrect**
Source of energy behind forces that drive endogenic movements is the Earth's internal heat due to radioactive decay and the gravitation. The subaerial erosion are are carried by exogenetic forces which are driven by atmospheric forces.	Exogenetic forces are degradational, and endogenetic forces are aggradational.	Diastrophic forces are classified under endogenetic forces.

Q.9) Consider the following statements about Paleomagnetism or fossil magnetism:

1. Statement 1: It acts as a decisive evidence for continental drift and global plate
2. Statement 2: It does not provide an understanding to the problems of thermal history of our planet.

Which of the statements given above is/are correct?

a) Statement 1 is correct only
b) Statement 2 is correct only
c) Both the statements are correct
d) Both the statements are incorrect

Q.9) Solution (a)

Basic Information:

- The record of the strength and direction of Earth's past magnetic field is called paleomagnetism or fossil magnetism.
- It is an important source of our knowledge about the Earth's evolution throughout the entire geological history. This record is preserved by many rocks from the time of their formation.
- The paleomagnetic data have played an instrumental role in deciphering the history of our planet including a decisive evidence for continental drift and global plate tectonics.
- The data have also been crucial for better understanding the problems of regional and local tectonics, geodynamics, and thermal history of our planet.

Statement Analysis:

Statement 1	Statement 2
Correct	**Incorrect**
Paleomagnetism is also called fossil magnetism. Study of past magnetic fields recorded in magnetic rocks help us in ascertaining about continental drift.	Fossil magnetism does help in understanding the thermal history of Earth.

Q.10) With reference to meanders, consider the following statements:

1. Riffles play an important role in the formation of meanders, but pools don't.
2. Meanders are formed only in the mature stage of a river.
3. Slip-off slope is formed on the concave side of a bend, whereas river cliff is formed in the convex side of a bend.

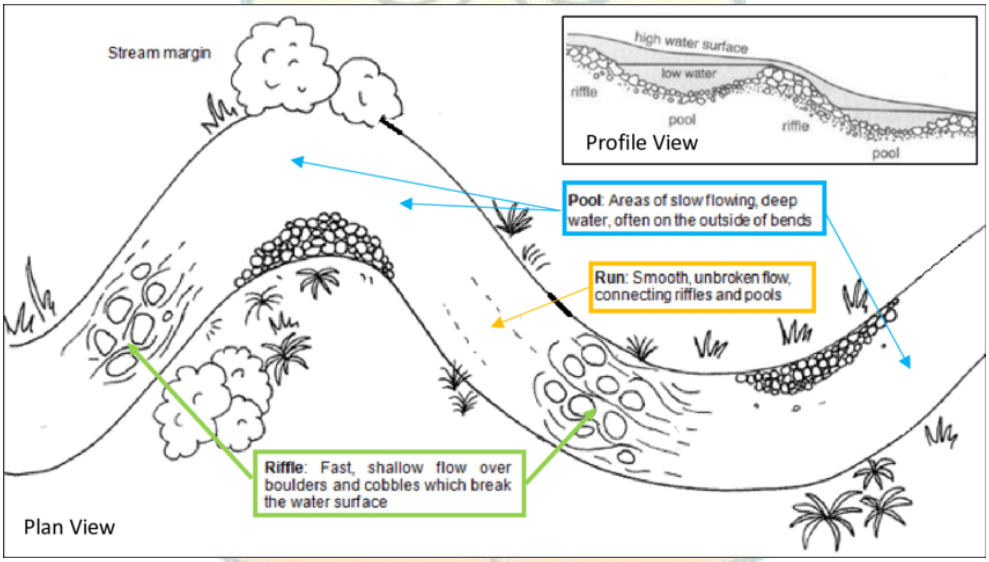
Which of the statements given above is/are correct?

a) 1 and 2 only
b) 2 and 3 only
c) 3 only
d) 1, 2 and 3

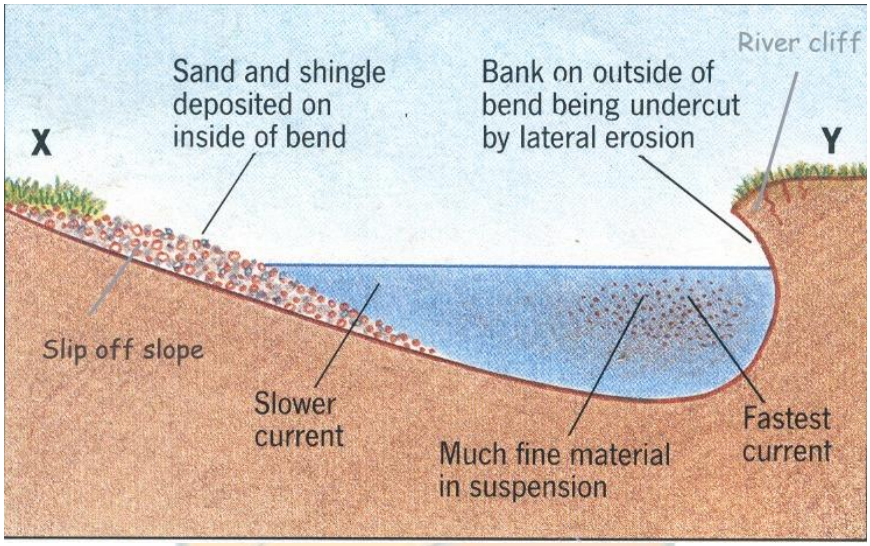
Q.10) Solution (c)

Basic Information:

- Riffles and pools both help in the formation of the meanders.



- Although, complete understanding of formation of meanders is still lacking, meanders are seen to be formed in all the stages of a river, albeit with very less probability in the youth stage.
- Jhelum river in the UT of Jammu & Kashmir is known to meander in the youth stage.
- Slip-off slope is formed on the concave side of a bend, whereas river cliff is formed on the convex side of a bend.



Statement Analysis:

Statement 1	Statement 2	Statement 3
Incorrect	**Incorrect**	**Correct**
Both riffles and pools help in the formation of meanders.	Jhelum meanders are formed in the youth stage.	Observe the figure.

Q.11) The term 'isostasy' is related to:

a) geodetic survey
b) gravity anomalies
c) energy equilibrium
d) weathering and erosion

Q.11) Solution (b)

Explanation:

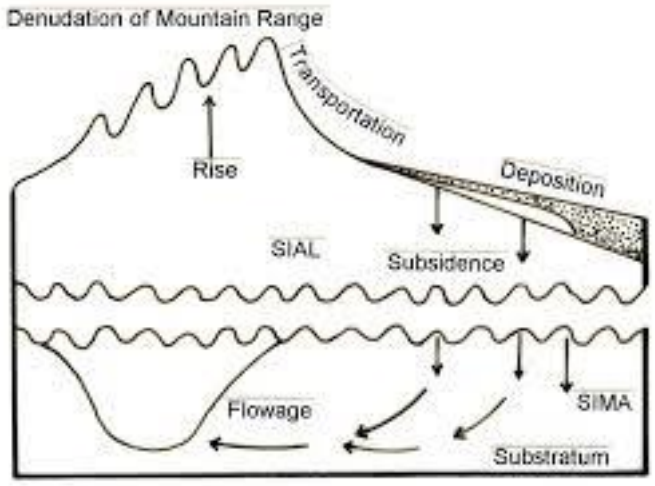
The term "Isostasy" is derived from "Isostasios", a word of Greek language meaning the state of being in balance.

Isostasy represents the **mechanical stability** between the upstanding parts and low lying basins

on a rotating earth.

Lateral variations in **gravity anomalies** are related to anomalous density distributions within the Earth. Locally measuring the gravity of Earth helps us to understand the planet's internal structure.

In large mountain areas, this is because of **isostasy**, the rock density of the mountain roots is lower, compared with the surrounding earth's mantle, causing a further gravity deficit.



Q.12) Consider the following statements regarding "Circum-Pacific belt":

1. It is characterized by convergent plate boundary only.
2. Fold Mountains are found along both the margins of Pacific Ocean.
3. It is prone to Tsunami.

Which of the above statements is/are correct?

a) 1 and 2 only
b) 2 and 3 only
c) 3 only
d) 1, 2 and 3

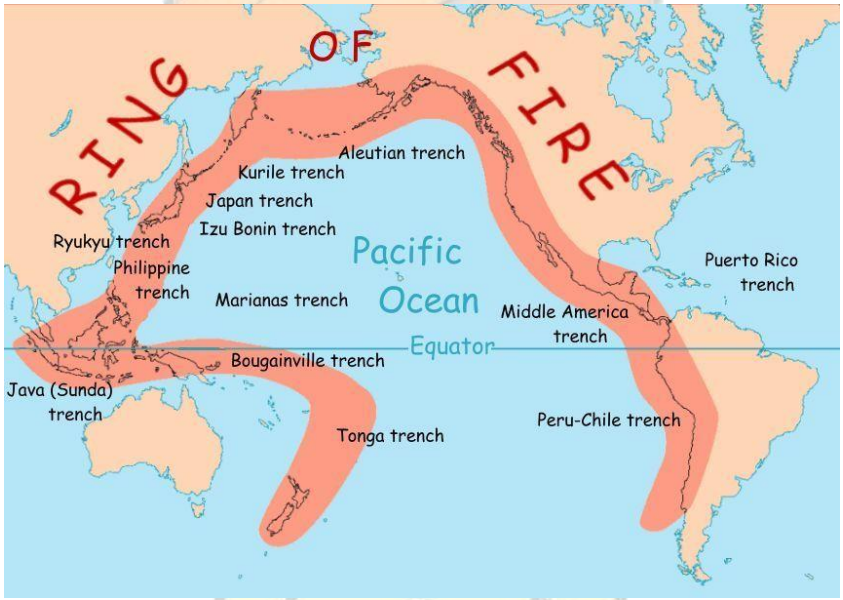
Q.12) Solution (c)

Basic Information:

The **Ring of Fire**, also referred to as the **Circum-Pacific Belt**, is a path along the Pacific Ocean characterized by active volcanoes and frequent earthquakes.

The Pacific Plate, an oceanic plate that forms the bed of the Pacific Ocean, is surrounded by a number of continental plates including the North American plate, South American plate, Philippine plate, the Australian-Indian plate and the Eurasian plate. The movement of these plates create zones of subduction (e.g. where the Pacific and Eurasian plates meet). This leads to the formation of volcanoes and the occurrence of earthquakes.

The Ring of Fire is the result of plate tectonics. Tectonic plates are huge slabs of the Earth's crust, which fit together like pieces of a puzzle. The plates are not fixed but are constantly moving atop a layer of solid and molten rock called the mantle.



Statement Analysis:

Statement 1	Statement 2	Statement 3
Incorrect	**Incorrect**	**Correct**
It is characterized by convergent boundary, divergent boundary as well as transform boundaries.	Fold mountains are formed only along eastern margin of Pacific Ocean. Example: Andes and Rockies.	Since the region is seismically active it is prone to tsunami.

Convergent: The Aleutian Islands in the U.S. state of Alaska, for example, run parallel to the Aleutian Trench. Both geographic features continue to form as the Pacific Plate subducts beneath the North American Plate. ***Divergent:*** The East Pacific Rise is a site of major seafloor spreading in the Ring of Fire. The East Pacific Rise is located on the divergent boundary of the Pacific Plate and the Cocos Plate (west of Central America), the Nazca Plate (west of South America), and the Antarctic Plate. ***Transform:*** The San Andreas Fault, stretching along the central west coast of North America, is one of the most active faults on the Ring of Fire.		

Q.13) "Continental Drift Theory" of Alfred Wegner was criticized and subsequently rejected. Which of the following were its criticism?

1. His theory starts from the carboniferous period and does not describe the conditions before this period.
2. His belief that both the tidal and pole fleeing forces are inadequate in moving continents.
3. His theory of Continents and Oceans of the same age.

Select the correct answer using the code given below:

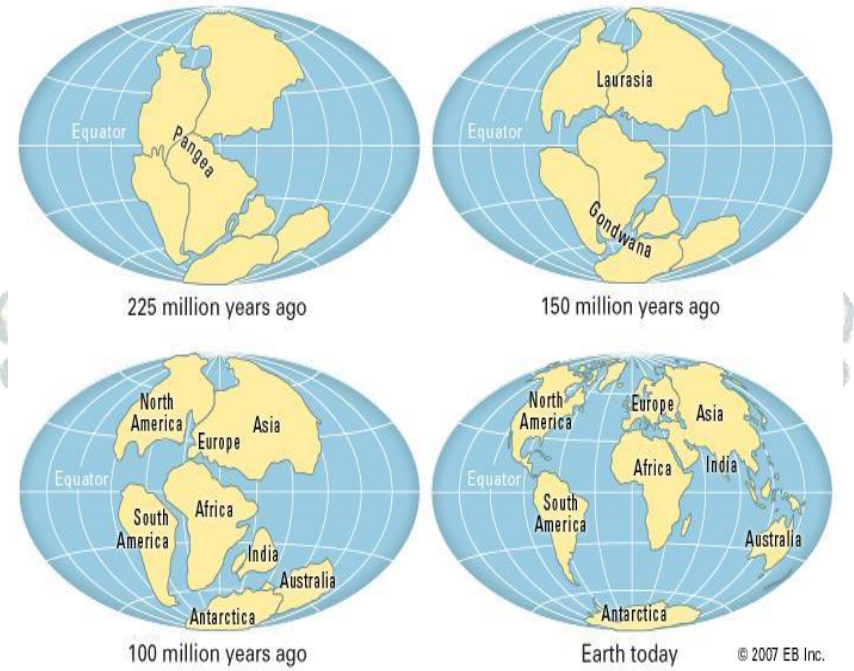
a) 1 only
b) 2 and 3 only
c) 3 only
d) 1, 2 and 3

Q.13) Solution (d)

Basic Information:

The theory of continental drift was put forth by Alfred Wegener, a German meteorologist, polar explorer, astronomer and a geologist. He is in fact known as the father of continental drift.

In a lecture in 1912, Wegener proposed a startling theory of 'continental drift'.



Statement Analysis:

Statement 1	Statement 2	Statement 3
Correct	**Correct**	**Correct**
Wegner was essentially a **climatologist** who was essentially reconstructing earth's climatic history. His theory starts from the carboniferous period and does not describe the conditions before this period.	Both the tidal and pole fleeing forces he suggested are believed to be **inadequate** in moving continents. According to experts had the gravitational force of moon or sun was so strong to cause the landmass to break, then it would have stopped the rotations of the earth and made it stationary. Also, in order to cause a drift in landmass the rotations required should be at such a high speed that it would have thrown the atmosphere (the gases) and everything else in the outer space away from the earth's gravitational pull.	As per Drift Theory, Ocean and Continents must be of the same age but later it was found out that **Oceans are much younger than the Continents**.

Q.14) Absence of surface drainage is a predominant characteristic of which of the following landform?

a) Fluvial Landforms
b) Glaciation landforms

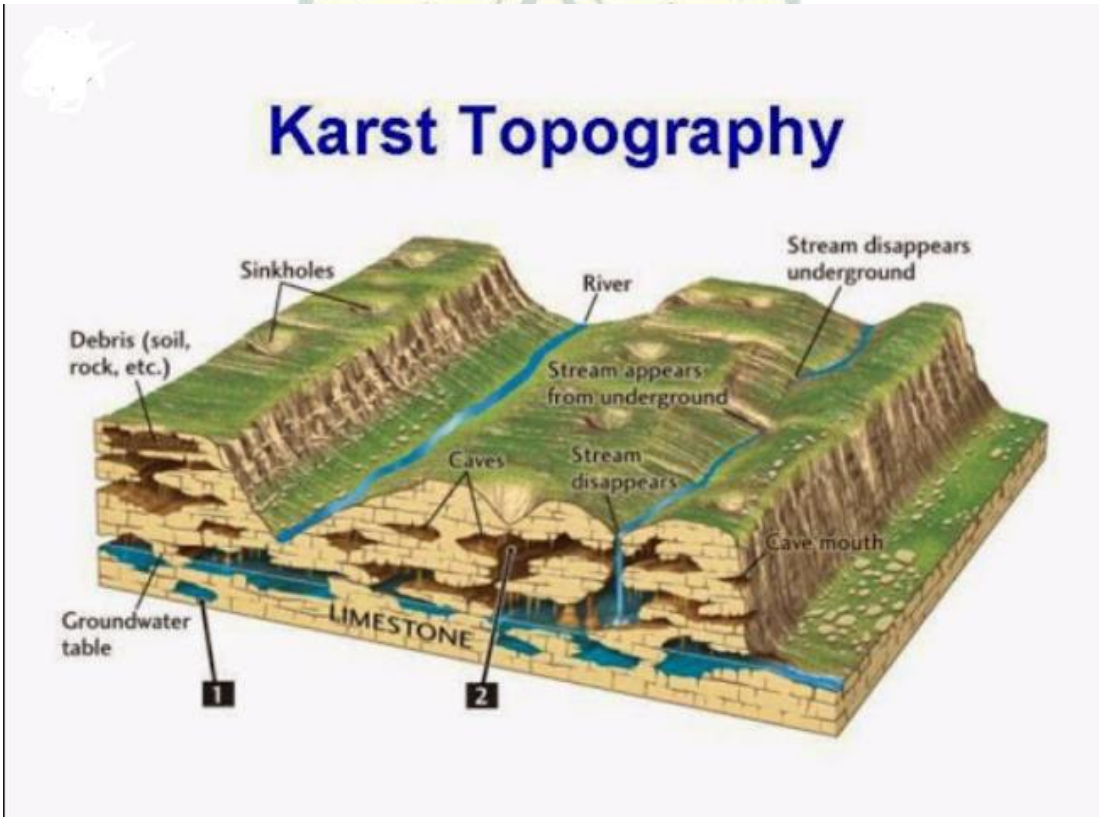
c) Limestone and chalk landforms
d) Volcanic landforms

Q.14) Solution (c)

Basic Information:

The **Karst region** is an example of Limestone and Chalk Landform with a large stretch of limestone. These regions have a bleak landscape, occasionally broken by precipitous slopes. There is a general absence of surface drainage as most of the surface water has gone underground. In this region, streams rising on other rocks only flow over limestone for a short distance and then disappear underground.

The solubility of limestone in water and weak acid solutions leads to karst landscapes, in which water erodes the limestone over thousands to millions of years. Most cave systems are carved from limestone bedrock.



Q.15) With reference to "fault", consider the following statements:

1. A fault is a fracture in the earth's crust due to tension force.
2. In case of normal fault, new surface is generated in the form of scarp.

Which of the above statements is/are correct?

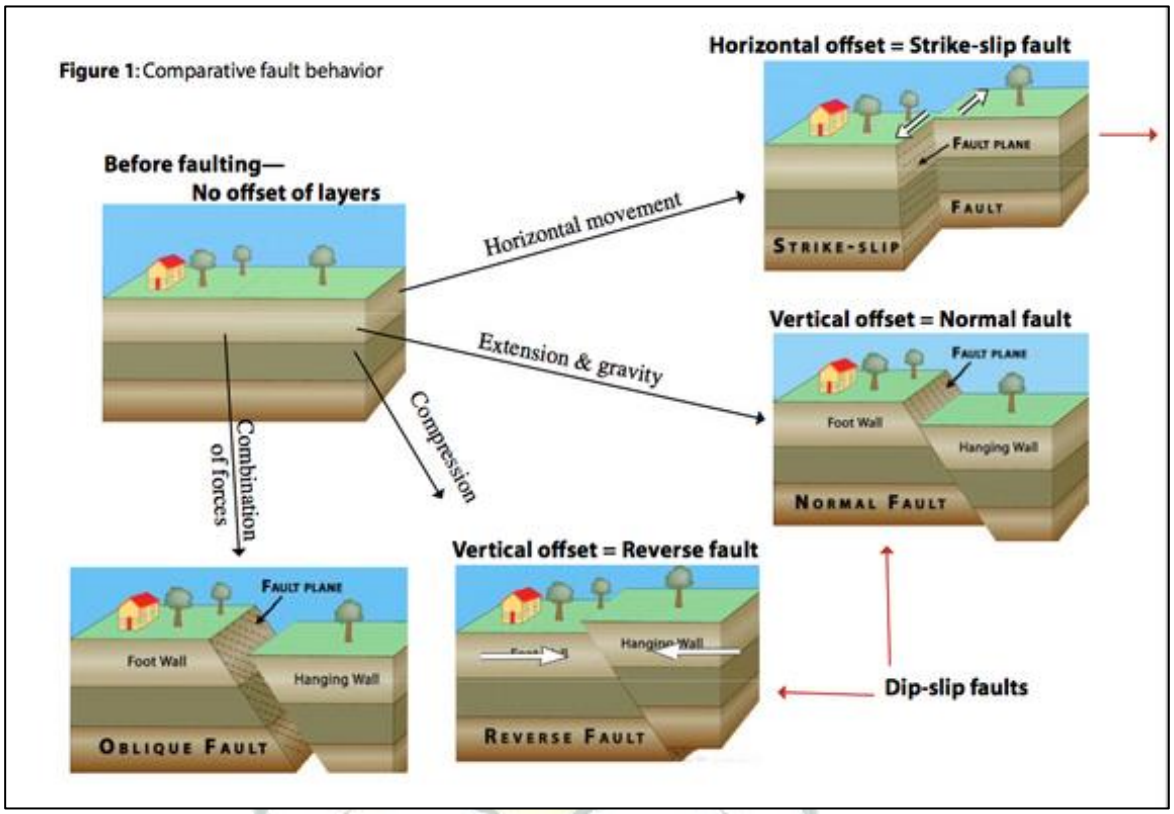
a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 and 2

Q.15) Solution (c)

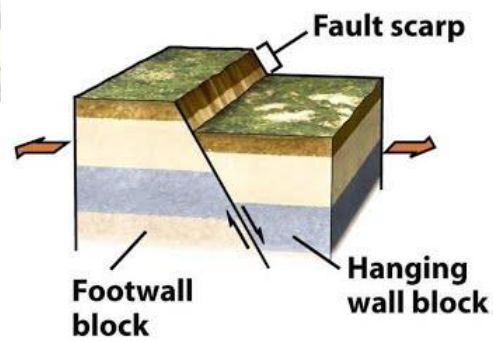
Basic Information:

A fault is a fracture or zone of fractures between two blocks of rock. It is a fracture in the earth's crust due to tension force. It can also occur due to compression in hard and brittle rocks.

- When there is **tension** the crust ruptures. One block is thrown upwards and the other downwards. The upthrown block is called **Horst** while the downthrown block is called **Graben**. The line along which the fault occurs is called strike. This fault is called normal fault and is most common. In case of a normal fault, new surface is generated in the form of scarp.
- When there is **compression**, in case of hard rocks instead of folding, the faulting occurs. The block with hanging wall is thrown upwards while the one with footwall is thrown downwards. This is called a **reverse fault**. In case of a reverse fault there is net destruction of the surface.
- When the forces are acting **parallel** to each other, along the line of fault the blocks move past each other without being upthrown or downthrown. This is called **lateral fault**.



Statement Analysis:

Statement 1	Statement 2
Correct	**Correct**
A fault is a **fracture** in the earth's crust due to tension force. It can also occur due to compression in hard and brittle rocks. Due to heavy compression, the crust **bends** in a zigzag wavy fashion. This is called a **fold**.	In case of a normal fault, new surface is generated in the form of scarp. 

Q.16) What are the characteristics associated with fjord?

1. A fjord is a long, deep, narrow body of water.
2. Fjords commonly are deeper in their middle and upper reaches than at the seaward end.
3. Fjords are commonly V-shaped valleys.

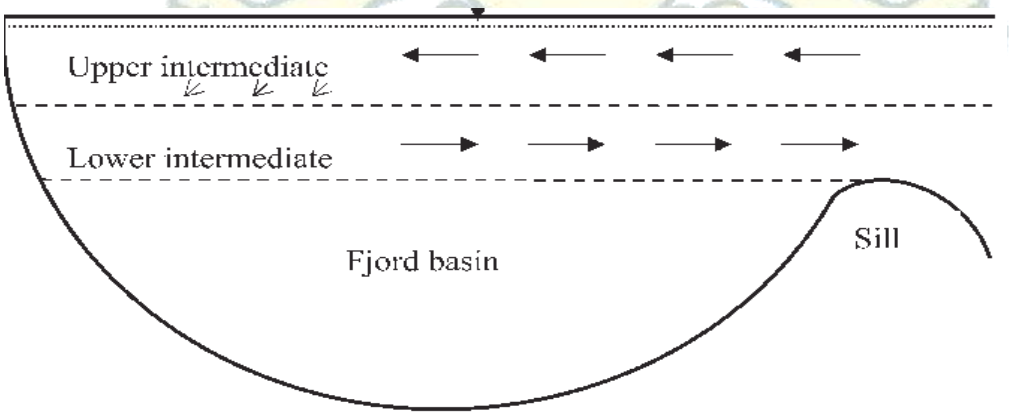
Select the correct answer using the code below:

a) 1, 2 and 3
b) 2 and 3 only
c) 1 and 2 only
d) 1 and 3 only

Q.16) Solution (c)

Basic Information:

- Fjord, also spelled 'fiord', long narrow arm of the sea, commonly extending far inland, that results from marine inundation of a glaciated valley.
- Many fjords are astonishingly deep; Sogn Fjord in Norway is 1,308 m deep, and Canal Messier in Chile is 1,270 m. The great depth of these submerged valleys, extending thousands of feet below sea level, is compatible only with a glacial origin.
- It is assumed that the enormous, thick glaciers that formed in these valleys were so heavy that they could erode the bottom of the valley far below sea level before they floated in the ocean water.
- After the glaciers melted, the waters of the sea invaded the valleys.
- Glacial erosion produces **U-shaped valleys**, and fjords are characteristically so shaped.



Statement Analysis:

Statement 1	Statement 2	Statement 3
Correct	**Correct**	**Incorrect**
This is basic definition of fjord.	Fjord valleys are U-shaped, therefore, they are deeper in the middle.	Fjords are U-shaped valleys.

Q.17) Consider the following statements about weathering:

1. Physical weathering happens especially in places where there is little soil and few plants grow, such as in mountain regions and hot deserts.
2. Exfoliation occurs as cracks develop parallel to the land surface, a consequence of the reduction in pressure during uplift and erosion.

Which of the above statements is/are correct?

a) Statement 1 is correct only
b) Statement 2 is correct only
c) Both the statements are correct
d) Both the statements are incorrect

Q.17) Solution (c)

Basic Information:

- Physical weathering is caused by the effects of changing temperature on rocks, causing the rock to break apart. The process is sometimes assisted by water.
- Physical weathering happens especially in places where there is little soil and few plants grow, such as in mountain regions and hot deserts.
- Exfoliation occurs when the rock mass at depth under high pressure from underlying rocks is relieved off of its pressure due to unloading. The tension is thus at right angle to the land surface producing cracks parallel to the land surface.

Statement Analysis:

Statement 1	Statement 2
Correct	**Correct**
Lack of rainfall and plants gives rise to more physical weathering.	Exfoliation is caused due release of super incumbent load.

Q.18) Consider the following statements about Aeolian processes:

1. Deflation is the intermittent, leaping movement of particles of sand or gravel, as from the force of wind.
2. Saltation is the lifting and removal of fine, dry particles of silt, soil, and sand by the blowing wind.
3. Abrasion is the mechanical scraping of a rock surface, by friction between rocks and moving particles, during their transport by wind.

Which of the above statements is/are correct?

a) 1 and 2 only
b) 2 only
c) 3 only
d) None of these

Q.18) Solution (c)

Basic Information:

- Saltation is the intermittent, **leaping movement** of particles of sand or gravel, as from the force of wind.
- Deflation is the **lifting and removal of fine**, dry particles of silt, soil, and sand by the blowing wind.
- Abrasion is the mechanical scraping of a rock surface, by friction between rocks and moving particles, during their transport by wind.

Statement Analysis:

Note: incorrect statements are asked.

Statement 1	Statement 2	Statement 3
Incorrect	**Incorrect**	**Correct**
Definition is wrong. Deflation is the **lifting and removal of fine**, dry particles of silt, soil, and sand by the blowing wind.	Definition is wrong. Saltation is the intermittent, **leaping movement** of particles of sand or gravel, as from the force of wind.	Definition is correct. Abrasion is the mechanical scraping of a rock surface, by friction between rocks and moving particles, during their transport by wind.

Q.19) Which among the below given pairs is/are correct?

1. Dykes : : horizontal intrusion of magma
2. Sills : : vertical intrusion of magma
3. Phacolith : : lens shaped mass of igneous rocks

Choose the correct answer using the codes given below:

a) 1 and 2 only
b) 3 only
c) 1, 2 and 3
d) None

Q.19) Solution (b)

- Dykes : : vertical intrusion of magma
- Sills : : horizontal intrusion of magma
- Laccolith : : dome-shaped mass of igneous rocks
- Lapolith : : saucer shaped igneous intrusion
- Phacolith : : lens shaped mass of igneous rocks

Q.20) Which of the following condition(s) will favour the phenomena of river capture?

1. Steep channel gradient of the captor river.

2. Higher sediment load in the captor river.
3. Low volume of water discharge in the captor river.
4. Soft rocks towards the head-ward direction.

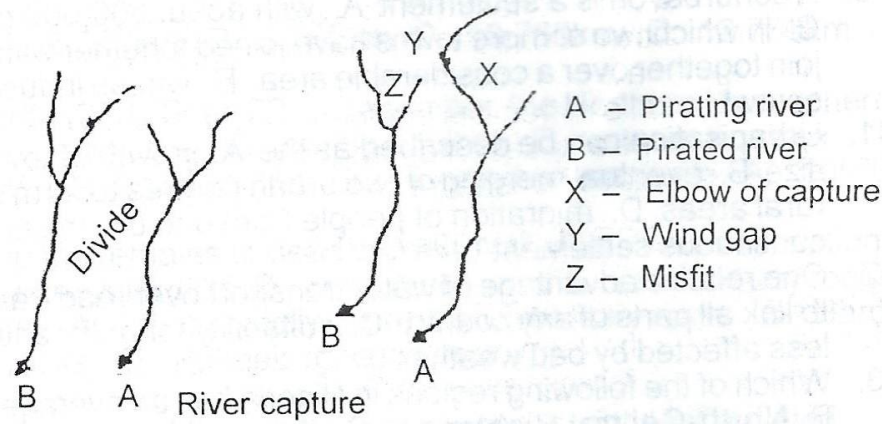
Select the correct code:

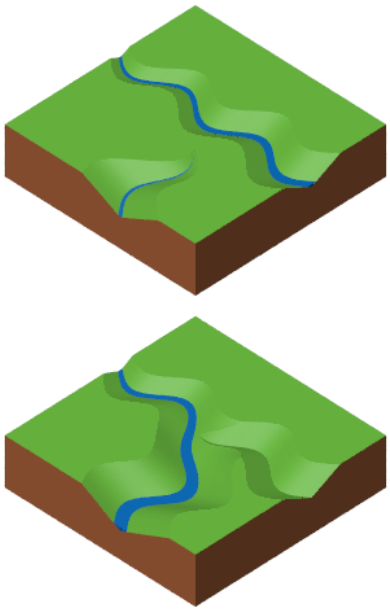
a) 1 and 4 only
b) 1, 2 and 4 only
c) 1, 3 and 4 only
d) 1, 2, 3, 4

Q. 20) Solution (a)

Basic Information:

- River capture is a natural process which is more active in the youthful stage of the valley development because the streams are actively engaged in head-ward erosion and valley lengthening.
- River capture also occurs during mature and senile stages of the valley development through the process of **lateral erosion and meander intersection.**
- The stronger and more powerful streams (in terms of channel gradient, stream velocity and discharge and kinetic energy) capture the upper courses of weak and sluggish streams.





River capture occurs under the following conditions:

- Steep channel gradient,
- Relatively narrow valley so that water may not spread in the otherwise wide and flat valleys,
- Higher volume of water so that velocity and discharge may be sufficiently high,
- Soft rocks so that the river may resort to rapid rate of head-ward erosion,
- Deeper valley than the valleys of other neighboring rivers, and
- Low sediment load so that the river may resort to active erosion etc.

Statement Analysis:

Statement 1	Statement 2	Statement 3	Statement 4
Correct	**Incorrect**	**Incorrect**	**Correct**
Steep channel will help in more head-ward erosion.	Higher sediment load will cause the river to slowdown and reduce head-ward erosion.	High volume of water discharge will favour head-ward erosion.	Soft rocks will be easy to erode.

Q.21) The Mission Karmayogi is the national programme for which of the following?

a) Doubling Farmer Income
b) Universal Vaccination against COVID19
c) Civil Services Capacity Building
d) Labour Welfare Reforms

Q.21) Solution (c)

'Mission Karmayogi' - National Programme for Civil Services Capacity Building aims to transform capacity-building in the bureaucracy through institutional and process reforms.

The Programme will be delivered by setting up an Integrated Government Online Training-iGOT Karmayogi Platform.

Q.22) Which of the following categories is/are eligible for finance under Priority Sector Lending (PSL)?

1. Loans to farmers both for installation of solar power plants
2. Loans for setting up compressed biogas plants
3. Bank finance to start-ups up to Rs. 500 crore

Select the correct answer using the code given below:

a) 1 and 3 only
b) 1 and 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.22) Solution (b)

Recently, the Reserve Bank of India (RBI) revised Priority Sector Lending (PSL) guidelines to align with emerging national priorities and also bring sharper focus on inclusive development.

Some of the salient features of revised PSL guidelines are:

- Fresh categories included in the PSL category:
    i. **Bank finance of up to ₹50 crore to start-ups**.
    ii. **Loans to farmers both for installation of solar power plants** for solarisation of grid-connected agriculture pumps.
    iii. **Loans for setting up compressed biogas (CBG) plants**.
- Higher weightage has been assigned to incremental priority sector credit in 'identified districts' where priority sector credit flow is comparatively low.
- The credit limits for renewable energy, health infrastructure, including the projects under 'Ayushman Bharat', have been doubled.
- It seeks to address the issues concerning regional disparities in the flow of priority sector credit at district level which includes:
- Ranking districts on the basis of per capita credit flow to the priority sector.

- Building an incentive framework for districts with comparatively low flow of credit and a disincentive framework for districts with comparatively high flow of priority sector credit.
- The targets prescribed for 'small and marginal farmers' and 'weaker sections' are being increased in a phased manner.
- Higher credit limit has been specified for farmer producer organisations (FPOs)/farmers producers companies (FPCs) undertaking farming with assured marketing of their produce at a pre-determined price.
- Loan limits for renewable energy have been doubled.

Q.23) Consider the following statements regarding Nairobi Convention:

1. It is part of UNEP's Regional Seas Programme.
2. India is a party to the Convention.

Which of the statements given above is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.23) Solution (a)

Statement 1	Statement 2
Correct	**Incorrect**
Nairobi Convention is a partnership between governments, civil society and the private sector, working towards a prosperous Western Indian Ocean Region with healthy rivers,	The Convention offers a regional legal framework and coordinates the efforts of the member states to plan and develop programmes that strengthen their capacity to protect, manage and develop their coastal and marine environment. Parties to the Convention

coasts and oceans. It entered into force in 1996 and **is part of UNEP's Regional Seas Programme.**	are Comoros, France, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, Tanzania and South Africa. **India is not a party to the Convention**.

Q.24) The Central Ground Water Authority (CGWA) has been constituted under which of the following Acts?

a) Water (Prevention and Control of Pollution) Act, 1974
b) The Air (Prevention and Control of Pollution) Act, 1981
c) Environment (Protection) Act, 1986
d) None of the above as CGWA is not a statutory body

Q.24) Solution (c)

Central Ground Water Authority (CGWA) has been constituted under Environment (Protection) Act, 1986 to regulate and control development and management of ground water resources in the country.

Q.25) Consider the following pairs:

Index	***Released by***
1. Human Capital Index	World Bank
2. Global Innovation Index	World Intellectual Property Organization
3. Economic Freedom Index	Economist Intelligence Unit

Which of the pairs given above is/are correctly matched?

a) 1 and 2 only
b) 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.25) Solution (a)

World Bank released the **Human Capital Index** (HCI) report for 2020. India has been ranked at the 116th position in the HCI 2020.

Global Innovation Index (GII) 2020 released by World Intellectual Property Organization (WIPO). India is at the 48th position in the list of top 50 innovative countries.

Economic Freedom Index 2020 - Canada's Fraser Institute. India slips 26 spots to 105th position.

Q.26) SAATHI (System for Assessment, Awareness and Training for Hospitality Industry) initiative is launched by which of the following?

a) Ministry of Commerce and Industry
b) Ministry of Culture
c) Ministry of Tourism
d) Ministry of Health and Family Welfare

Q.26) Solution (c)

Ministry of Tourism has partnered with the Quality Council of India (QCI), to assist the Hospitality Industry through an initiative called **SAATHI (System for Assessment, Awareness and Training for Hospitality Industry)**.

It seeks to sensitize the industry on the COVID regulations by the government and instill confidence amongst the staff and guests that the hospitality unit has exhibited intent towards ensuring safety and hygiene at the workplace.

Q.27) Which of the following statements regarding the National Commission for Indian System of Medicine (NCISM) is/are correct?

1. It is a statutory body constituted under National Medical Commission Act, 2019.
2. It frames policies for the regulation of medical professionals and institutions for Indian System of Medicine.

3. It ensures the coordination among the Board of Homoeopathy, Medical Assessment and Rating Board and Ethics and Medical Registration Board.

Select the correct answer using the code given below:

a) 1 and 3 only

b) 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.27) Solution (b)

Statement 1	Statement 2	Statement 3
Incorrect	**Correct**	**Incorrect**
National Commission for Indian System of Medicine (NCISM) is a statutory body constituted under the **National Commission for Indian System of Medicine Act (NCISM), 2020.** The NCISM will consist of 29 members, appointed by the central government.	Functions of NCISM are to frame policies for the regulation of medical professionals and institutions for Indian System of Medicine and to assess the human resources and infrastructure required in relation to healthcare.	Other functions of NCISM is to ensure that the State Medical Councils of Indian System of Medicine adhered to the regulations laid down by the NCISM Act and to ensure that the autonomous boards (Board of Ayurveda, Unani, Siddha and Sowa-Rigpa, Medical Assessment and Rating Board and Ethics and Medical Registration Board) set up under the NCISM Act worked in coordination with each other. **These functions related to Homoeopathy are done by National Commission for Homoeopathy.**

Q.28) Which of the following State government is developing 'Sanskrit Grams' to teach people to use Sanskrit regularly?

a) Uttarakhand
b) Maharashtra
c) Uttar Pradesh

d) Madhya Pradesh

Q.28) Solution (a)

The Uttarakhand Government has decided to develop 'Sanskrit Grams' across the state to teach people to use Sanskrit regularly.

Several villages were selected according to the availability of Sanskrit schools so that teachers may visit the villages often and motivate residents to learn and use Sanskrit.

Villages were selected at the meeting of the Uttarakhand Sanskrit Academy, chaired by the Uttarakhand Chief Minister.

The Academy shall also be renamed as Uttaranchal Sanskrit Sansthanam Haridwar, Uttarakhand.

Q.29) Which of the following is/are types of Assisted Reproductive Technologies (ARTs)?

1. Intrauterine Insemination
2. Gamete IntraFallopian Transfer
3. In Vitro Fertilization

Select the correct answer using the code given below:

a) 1 and 2 only
b) 1 and 3 only
c) 2 and 3 only
d) 1, 2 and 3

Q.29) Solution (d)

Assisted reproductive technology (ART) includes medical procedures used primarily to address infertility.

Assisted Reproductive Technology (ART) (Regulation) Bill, 2020 defines ART to include all techniques that seek to obtain a pregnancy by handling the sperm or the oocyte (immature egg

cell) outside the human body and transferring the gamete or the embryo into the reproductive system of a woman.

Different Types of Assisted Reproductive Technology (ART):

a) **In Vitro Fertilization (IVF)** - It is the most common form of ART that is used by maximum patients. In this, woman's eggs are combined with man's sperm in a laboratory. The fertilised egg is then placed inside the woman's uterus in a procedure called embryo transfer.

b) **Gamete IntraFallopian Transfer (GIFT)** - Ovum collected from the donor is transferred to the fallopian tube of the recipient along with the sperm. Fertilization occurs inside a woman's body in GIFT treatments and not in a lab.

c) **Intrauterine Insemination** (IUI) - it involves insertion of the male partner's (or a donor's) sperm into a woman's uterus at or just before the time of ovulation by long narrow tube.

d) In **Gestational Surrogacy**, the child is not biologically related to the surrogate mother, who is often referred to as a gestational carrier. Instead, the embryo is created via IVF, using the eggs and sperm of the intended parents or donors, and is then transferred to the surrogate.

Q.30) The Factories Act, 1948, Mines Act, 1952 and Contract Labour (Regulation and Abolition) Act, 1970 are consolidated under which of the following Labour codes?

a) Code on Wages
b) Industrial Relations Code
c) Social Security Code
d) Occupational Safety, Health and Working Conditions Code

Q.30) Solution (d)

Labour Code	**Labour Acts replaced/consolidated/subsumed**
Code on Wages	Minimum Wages Act, 1948; Payment of Wages Act, 1936; Payment of Bonus Act, 1965; Equal Remuneration Act, 1976.

Industrial Relations Code	Industrial Disputes Act, 1974; Trade Unions Act, 1926; Industrial Employment (Standing Orders) Act, 1946.
Social Security Code	Employees' Provident Fund Act, 1952; Maternity Benefit Act, 1961; Unorganised Workers' Social Security Act, 2008.
Occupational Safety, Health and Working Conditions Code	Factories Act, 1948; Mines Act, 1952; Contract Labour (Regulation and Abolition) Act,1970.

Q.31) There is a huge escalator in Bengaluru International Airport with 500 steps moving with a speed of 20steps/min. Arun walks at a speed of 25steps/min. How long it will approximately take him to go up the escalator if he is also walking?

a) 11mins
b) 15mins
c) 19mins
d) 25mins

Q.31) Solution (a)

Net relative speed when both escalator and Arun is moving = 45steps/min

Time required to reach to the top = 500/45 ~ 11mins

Q.32) In a 100 m race, A beats B by 10 m and C by 20 m. In a race of 180 m, B will beat C by

a) 20 m
b) 30 m
c) 40 m
d) 60 m

Q.32) Solution (a)

A : B = 100:90

A : C = 100:80

B/C = (B/A) (A/C) = (90/100) (100/80) = 9/8

When B runs 9 m, C runs 8 m

When B runs 180 m, C runs = $\frac{8}{9}$(180)

Therefore, B beats C by (180-160) m = 20 m

Q.33) In a 200 metres race A beats B by 35 m or 7 seconds. What is the A's time over the course?

a) 40 second
b) 45 second
c) 33 second
d) 30 second

Q.33) Solution (c)

B runs 35 m in 7 sec.

Therefore, B covers 200 m in (7x200)/35 = 40 sec

B's time over the course = 40 sec

Therefore, A's time over the course = (40-7) = 33 sec

Q.34) A bag contains 50 paisa, 25 paisa and 10 paisa coins in the ratio 5:9:4, amounting to Rs 206. Find the number of coins of 50 paisa.

a) 200
b) 160
c) 150
d) 300

Q.34) Solution (a)

According to the question coin ration is

5:9:4

Now the value ratio will be

5x50:9x25:4x10

250:225:40

50:45:8

This value amounts to Rs 103, given amount is 206

So, 100:90:16

Clearly value of 50 paisa coins is 100 Rs which means the number of 50 paisa coins will be 200

Q.35) Shankar covers a distance of 30 km by autorikshaw in 35 min. After deboarding the rickshaw, he took rest for 20 min and covers another 10 km by a taxi in 20 min. Find his average speed for the whole journey

a) 24 km/hr
b) 32 km/hr
c) 18 km/hr
d) 22 km/hr

Q.35) Solution (b)

Total distance covered = (30+10) = 40 km

Total time taken = (35+20+20) = 75 min = 5/4 hr

We know that,

Average speed = Total distance covered/Total time taken = 40/(5/4) = 32 km/hr

So, the average speed for the whole journey is 32 km/hr