IASBABA'S TLP 2023 (PHASE – 1) – DAY 25 SYNOPSIS

1. What is a continental rift zone? How do they form? Explain. Give an example of an active continental rift zone.

Approach

Candidates can start the answer with giving basic idea of continental rift zone and simply as per demand highlight its formation and give examples on active continental rift zone world over.

Introduction

Continental rift zones occur in weak spots in the continental lithospheric plate. Rift zones are found both on the continents and on the floor of ocean basins.

Body

Formation:

- In terms of the theory of plate tectonics, they occur in divergence zones, belts where two of the various lithospheric plates that make up the Earth's surface are separating.
- Where tectonic plates move away from one another the lithosphere thins. The underlying asthenosphere rises and expands like a hot-air balloon, elevating a broad region. If the plate is capped by thick continental crust, the resulting continental rift zone rises high above sea level.

Examples of continental rift zone:

- The biggest active continental rift valleys on Earth are the East African Rift, the Baikal Rift Valley, the West Antarctic Rift, and the Rio Grande Rift.

Great Rift Valley:

- The Great Rift Valley is a geographical feature running north to south for around 6,400 kilometres from northern Syria to central Mozambique in East Africa.
- The northernmost part of the Rift forms the Beqaa Valley in Lebanon.
- Farther south, the valley is the home of the Jordan River which continues south through the Jordan Valley into the Dead Sea on the Israeli-Jordanian border.

East African Rift Valley:

- The Eastern Rift Valley (also known as Gregory Rift) includes the main Ethiopian Rift, running eastward from the Afar Triple Junction, which continues south as the Kenyan Rift Valley.
- The Western Rift Valley includes the Albertine Rift, and farther south, the valley of Lake Malawi.
- To the north of the Afar Triple Junction, the rift follows one of two paths: west to the Red Sea Rift or east to the Aden Ridge in the Gulf of Aden.

Pacific Ocean:

- In the Pacific Ocean, the East Pacific Rise has created rift valleys where the Pacific plate is separating from the North American plate, Cocos plate, Nazca plate, and Antarctic plate.

Baikal Rift Zone:

- The Baikal Rift Valley is formed by a divergent plate boundary, where the Amur plate is slowly tearing itself away from the Eurasian plate, and has been doing so for about 25 million years.

Conclusion

The Rift zone is being formed, most likely as a result of mantle plumes and eventually as a result of the African super swell. The Rift Structures are a complicated system of rift segments that serves as a modern analogy their evolution provide background research for sustaining loss and resistive measures.

Q-2-With the help of suitable examples explain the formation of fault block mountains.how they are different from vault or dome mountains? Discuss .

Approach-

In this question candidates need to write about formation of fault mountains along with examples.In second part discuss about how they are different from dome mountains.

Introduction -

A mountain can be defined as the natural elevation on the earth's surface. It may be broad at the base and narrow at the top. There are four types of mountains classified on the basis of formation and nature. They are Fold Mountains, Block Mountains, Volcanic Mountains, and Dome Mountains.

Body -

The Block Mountains are formed due to faults in the crust, which are planes where rocks have moved past each other, generating "block mountains".

- A mountain can be formed when the rocks on one side of a fault rise relative to the other. Block mountains, or horsts, are raised blocks.
- Block Mountains are formed as the result of damage caused by the tensile and compressive forces caused by endogenous forces from the Earth's interior, also known as fault-block mountains.
- The Block mountains represent an upright portion of the land between two faults or on either side of a valley or canyon gap.

Formation of Block Mountains-

- Block mountains are formed due to the upward movement of the middle block between two normal faults. The up-thrown block is also called a horst. The submitter area of such a block mountain is of the flat surface but the side slopes are very steep.

- Block mountains may be formed when the side blocks of two faults move downward whereas the middle block remains stable at its place.
- It is apparent that the middle block projects above the surrounding surface because of the downward movement of side blocks.
- Such block mountains are generally formed in high plateaux or broad domes.
- .
- Thus, the side blocks become horsts and block mountains. Such mountains are associated with the formation of rift valleys.
- When a fault block is raised or tilted, block mountains can result. Higher blocks are called horsts and troughs are called grabens.
- A spreading part of the surface causes tensional forces.
- When the tensional forces are strong enough to cause a plate to split apart, it does so much that a center block drops down relative to its flanking blocks.
- Block mountains may be found in India's central-western region, such as the Satpura and Vindhya mountains.

There are two basic types of block mountains:

- Tilted block mountains have one steep side contrasted by a gentle slope on the other side.
- Lifted block mountains have a flat top and extremely steep slopes.

Examples of block mountains -

- A Sierra Nevada Range, where delamination created a block 650 km long and 80 km wide that consists of many individual portions tipped gently west, with east-facing slips rising abruptly to produce the highest mountain front in the continental United States.
- Block mountains include the Great African Rift Valley (valley floor is graben), the Rhine Valley (graben) in Germany, the Vosges mountain range in France, the Sierra Nevada in the United States, and the Harz mountains in Germany.
- Block mountains are also called fault-block mountains since they are formed due to faulting as a result of tensile and compression.

Dome mountains -

- A mountain range resulting from dissection of a structural dome
- A structural dome is generated when a region of flat-lying sedimentary strata is bent or bowed upward, forming a dome mountain.
- When magma cools, it forms a huge dome of harder rock beneath the surface, which erosion occasionally exposes.
- The top of the dome gets eroded by wind and rain since it is higher than its surroundings. As a result, a circular mountain range emerges.
- Dome Mountains ranges are made up of numerous individual peaks formed by worn-away domes.

Fault block mountains . They have continental type of crust They have found in western united states . In uplift mechanism they have uplift forces Block mountains may be formed when the middle block between two normal faults moves downward. Examples -Sierra newada mountains . In India they are found in south western region such as Satpura and vindya mountains .	Vault or dome mountains . They have crustal and igneous rock inland . They found in isolated structures in in flat lying sedimentary rocks . In uplift mechanism they have igneous intrusion Dome mountains arise when enormous globs of magma float up from beneath the crust and push up top rocks, causing the crust to bulge in a rounded shape. Examples -The Weald in Southeast England and The Black Hills of South Dakota are typical examples of Dome Mountains.	

Conclusion-

When a fault block is raised or tilted, block mountains are formed. Higher blocks are called horsts and troughs are called grabens. A spreading apart of the surface causes tensional forces. When the tensional forces are strong enough to cause a plate to split apart, it does so much that a center block drops down relative to its flanking blocks.

Q-3-What do you understand by process of glaciation ? What are the landform associated with glaciation ? Explain with the help of suitable examples .

Approach -

In this question candidates need to write about process of glaciation and land-forms associated with glaciation. Give some examples of land-forms created through glaciation .

Introduction-

Glaciers are the mass movement of the ice that can change the entire landscape. They can sculpt mountains and carve valleys. Glaciers can move a vast quantity of rocks and sediments and creates landforms.

Body -

As glaciers move across a landscape, they alter the terrain and carve out unique formations. This process is called glaciation,

- It is responsible for many of the most recognizable landscapes on Earth.
- Glacial processes are the way that glaciers shape the land through processes of weathering, erosion, transportation, and deposition. Abrasion and plucking are the two main glacial processes of erosion.

Glacial Erosional Landforms-

Cirque/Corrie-

- Hollow basin cut into a mountain ridge.
- It has steep sided slope on three sides, an open end on one side and a flat bottom.
- When the ice melts, the cirque may develop into a tarn lake.

Glacial Trough-

- Original stream-cut valley, further modified by glacial action.
- It is a 'U' Shaped Valley. It at mature stage of valley formation.
- Since glacial mass is heavy and slow moving, erosional activity is uniform – horizontally as well as vertically.
- A steep sided and flat bottomed valley results, which has a 'U' shaped profile.

Hanging Valley-

- Formed when smaller tributaries are unable to cut as deeply as bigger ones and remain 'hanging' at higher levels than the main valley as discordant tributaries.
- A valley carved out by a small tributary glacier that joins with a valley carved out by a much larger glacier.

Arete-

- Steep-sided, sharp-tipped summit with the glacial activity cutting into it from two

Horn-

- Ridge that acquires a 'horn' shape when the glacial activity cuts it from more than two sides.

D-Fjord -

- Steep-sided narrow entrance-like feature at the coast where the stream meets the coast.
- Fjords are common in Norway, Greenland and New Zealand.

Glacial Depositional Landforms-

- Glacial Depositional Landforms - eskers-morains

Outwash Plain-

- When the glacier reaches its lowest point and melts, it leaves behind a stratified deposition material, consisting of rock debris, clay, sand, gravel etc. This layered surface is called till plain or an outwash plain.

Esker-

- Winding ridge of un-assorted depositions of rock, gravel, clay etc. running along a glacier in a till plain.
- The eskers resemble the features of an embankment and are often used for making roads.

Kame Terraces-

- Broken ridges or un-assorted depositions looking like hump in a till plain.

Drumlin-

- They are smooth oval shaped ridge-like features composed mainly of glacial till with some masses of gravel and sand.
- The long axes of drumlins are parallel to the direction of ice movement.
- They may measure up to 1 km in length and 30 m or so in height.
- The drumlin end facing the glacier is called the stoss end and is blunter and steeper than the other end called tail.

Kettle Holes-

- Formed when the deposited material in a till plain gets depressed locally and forms a basin.

Moraine-

- They are long ridges of deposits of glacial till.
- Terminal moraines are long ridges of debris deposited at the end (toe) of the glaciers.
- Lateral moraines form along the sides parallel to the glacial valleys.
- Many valley glaciers retreating rapidly leave an irregular sheet of till over their valley floors called ground moraines.
- The moraine in the centre of the glacial valley flanked by lateral moraines is called medial moraine.
- They are imperfectly formed as compared to lateral moraines. Sometimes medial moraines are indistinguishable from ground moraines.

Conclusion-

In glacial landforms, glacial erosion landforms occur due to scouring of land surface due to deposition of ice and snow and glacial depositional landforms is the depositions of crushed rocks and sands after the melting of glacial.