

- Extrusive landforms include mid-oceanic ridges, shield volcanoes, composite volcanoes, caldera lake, cinder cone etc.
- Intrusive landforms include batholiths, laccoliths, phacoliths, , lopoliths ,dykes and sills.

Exogenic Processes

Weathering, mass wasting, erosion and deposition are exogenic geomorphic processes. These processes are a direct result of stress induced in earth materials due to various forces that come into existence due to sun's heat.

- **Weathering:** It is defined as mechanical disintegration and chemical decomposition of rocks through the actions of various elements of weather and climate
- **Mass movement:** These movements transfer the mass of rock debris down the slopes under the direct influence of gravity.
- **Erosion:** It is a process in which the weathered rock material is transported by the water, wind and other agents.
- **Deposition:** It is a consequence of erosion. The erosional agents lose their velocity and energy on gentle slopes and materials carried by them start to settle themselves.

The variety of landforms is caused by these different processes via action of different agents, such as:

- **Running water:** V-shaped valleys, incised or entrenched meanders, flood plains, deltas, ox-bow Lake, meanders.
- **Glaciers:** U-shaped valleys, cirque, hanging valleys, morains, eskers, outwash plains and drumlins.
- **Wind:** pediplains, deflation hollows, mushroom tables, sand dunes, loess.
- **Wave Action:** emergent and submergent coasts, cliffs, terraces, stumps, caves and stacks; bars spits and lagoons.

Both exogenic and endogenic forces act simultaneously. Primary landforms come into existence because of endogenic processes. They get modified and destroyed, creating secondary landforms, which are a result of both endogenic and exogenic forces.

10. *Explaining the concept of Lapse Rate, examine its relationship with atmospheric stability.* (150 words) 10

Approach:

- Explain what is Lapse Rate and highlight its types.
- Elaborate its relationship with atmospheric stability/instability using graphs, equations.

Answer:

Lapse rate is rate of change in temperature **observed** while moving upward through the Earth's atmosphere. It is considered positive when the temperature decreases with elevation, zero when the temperature is constant and negative when the temperature increases with elevation (temperature inversion).

Types of lapse rates:

- **Environmental Lapse Rate (ELR):** This is the actual measured decrease in temperature with height above the ground (the rate which is actually occurring, not a theoretical rate). Generally, this is about 6.5 C per 1000 m. This rate does vary and depends on local air conditions.
- **Adiabatic lapse Rate (ALR):** When a parcel of air mass rises adiabatically, it cools at an Adiabatic lapse rate. Adiabatic processes are those where no exchange of heat takes place between the system and the environment. The parcel of air can be assumed to be relatively isolated from the surrounding environment because of the distinct physical properties (temperature & humidity) As such, when it rises, the air expands and the energy to expand comes from the molecules of air within that parcel. These molecules lose their energy and hence the air mass becomes cold on rising and expanding. Depending on the saturation of the air mass, there are two types of ALR: