

## 5.1.SLOPE FAILURE MECHANISMS:

In Geotechnical engineering the term slope commonly refers to a soil mass with its surface inclined to the horizontal and there exist both natural slopes and manmade slopes.

**Natural Slopes and Manmade slopes :** They are exist in nature and are formed cuttings, the slope of embankments constructed for taking roads, railways lines etc.,and the slope of earth dams constructed for storing water are example of manmade slopes.

**Sliding soil mass:** A slope failure involves downward and outward movement of a portion of slope called the sliding soil mass.

**Land slide :** A slope failure occurring in the case of a natural slope is referred to as landslide.

**Slip surface :** In a slope failure the sliding soil mass slips along a surface called the slip surface.

### 5.1.1.Causes of Slope failure

**Erosion:** The wind and flowing water causes erosion of top surface of slope and makes the slope steep and thereby increase the tangential component of driving force.

**Steady Seepage:** Seepage forces in the sloping direction add to gravity forces and make the slope susceptible to instability. The pore water pressure decreases the shear strength. This condition is critical for the downstream slope.

- 1. Sudden Drawdown:** in this case there is reversal in the direction flow and results in instability of side slope. Due to sudden drawdown the shear stresses are more due to saturated unit weight while the shearing resistance decreases due to pore water pressure that does not dissipate quickly.

2. **Rainfall:** Long periods of rainfall saturate, soften, and erode soils. Water enters into existing cracks and may weaken underlying soil layers, leading to failure, for example, mud slides.
3. **Earthquakes:** They induce dynamic shear forces. In addition there is sudden buildup of pore water pressure that reduces available shear strength.
4. **External Loading:** Additional loads placed on top of the slope increases the gravitational forces that may cause the slope to fail.
5. **Construction activities at the toe of the slope:** Excavation at the bottom of the sloping surface will make the slopes steep and thereby increase the gravitational forces which may result in slope failure.

#### **5.1.2.Types of Slopes :**

**a) Infinite Slopes :** The term infinite slope is used to designate as a constant slope of infinite extent in very large. The boundary surface of a soil is infinite mass and the properties of soil will be the same at identical depths so that the slip surface will be plane parallel to the surface of slope. The long slope of a mountain is an example of infinite slopes.

#### **b) Finite Slopes:**

A finite slope is limited in extent and the properties of soil will not be the same at identical depths so that the slip surface will be curved. The inclined faces of earth dam, embankments are the examples for finite slopes.