Introduction

1.1 Soil and soil Engineering

1.2 Scope of soil mechanics

1.3 origin and formation of soil.

1.1 Soil and Soil Engineering :-

For engineering purposes soil can be defined as the loose, unconsolidated inorganic material on the earth's crust produced by disintigration of rocks with or without organic matter.

Soil Mechanics is the study of engineering behaviours/properties (strength, bearing capacity of soil, permeability of soil, deformation and resistance to deformation under different boundary & loading conditions etc) of soil when it is used either as a construction material or as foundation material.

1.2 Scope of soil mechanics :

~ Plays very important role for the stability of the structure as every structure has to be founded on the soil. and transmit the dead and live load to the soil stratum.

~ The class of problems where the structures and the soil mutually interact are known as 'soil-structure interactions'.

~ The significance of soil mechanics in structural engineering are

- Foundations
- under-ground & earth retaining structure
- Earthen Dams
- Embankments

1.3 Origin and formation of soil :-

~ The soil formation takes place by the disintegration and decomposition of rocks and mineral through the action of natural, mechanical or chemical agents.

~ Actions like changes in temp and pressure, erosion, transport by wind, water, glaciers or chemical action as crystal growth, oxidation, hydration, carbonation, leaching can lead to weathering of rocks resulting soil formation.

Rocks → Weathering (Physical/chemical) → Transportation → Boulder

- acidic nature: Gravel, Sand
- basic nature: Silt, Clay

↓ size reduces

~ Soils can be classified into two types - ① Residual soil
② Transported soil

- Residual soil :-
  - Product of weathering stays near the place of origin.
  - partially disintegrated coarse grains having indefinite shape

~ Transported soil :-
  - transported from its place of origin by wind, water, ice or any other agency and has been redeposited.
  - Characteristics of soil are influenced by the agency of transportation. Char- size
    shape and roundness
    surface texture
    degree of sorting.

~ Transported soils are further classified depending upon the transportation agency and place of deposition

(1) Alluvial soil — transported by river / stream ; sedimentary clays

(2) Aeolian soil — Soil transported by wind ; Loess.

(3) Glacial soil — soil transported by Glacial ; Glacial Till

(4) Lacustrine soil — soil deposited in quite lake beds.

(5) Marine soil — Soil deposited in sea beds.

(6) Colluvial soil — deposited through the action of landslide / slope wash.

Soil encountered in field :-

(1) Bentonite :- decomposed volcanic ash.
~ contain high percentage of clay mineral montmorillonite
~ exhibits high degree of shrinkage & swelling

(2) Black cotton soil :- high %.ge of montmorillonite
~ expansive nature.
~ high shrinkage / swelling behaviour.

(3) Laterite ; deep brown soil of cellular str.
~ hardened on exposure to air formation of hydrated iron oxide

(4) Loam : mixture of sand silt, clay-size particle in equal proper

(5) Moorum : gravel mixed with red clay.

(6) Peat :- made up of partially decomposed vegetation or highly organic matter.

Properties of Transported soil :

Soil type	particle shape	GSD	compressibility	strength	Permeability
alluvial	rounded - Sub rounded	depends up energy of stream	Low/high	low/med	low/med
Aeolian	well rounded	Silt & Sand	low/med	high-dry low-wet	high
Glacial	angular fragments	mixed	low	high	low
Lacustrine	plate like/ rounded	Fine	high	low	low
Marine	rounded/ Sub-rounded	vary	mid/high	low/mid	mid/high