TABLE 1.1 Principle soil types with respect to their modes of formation.

MAJOR SOIL TYPE	BRIEF DESCRIPTION WITH TYPICAL NAMES	TYPICAL ENGINEERING CHARACTERISTICS
1.RESIDUAL SOILS Soils formed by in-place weathering of rocks	**Coarse-grained Soils (gravels, sands)** Formed by solution and leaching of cementing material, leaving the more resistant particles: such as quartz. **Fine-grained Soils (silts, clays)** Formed by decomposition of silicate rocks, disintegration of shales and solution of carbonates in limestone. With few exceptions becomes more compact rockier, and less weathered with increasing depth. At intermediate stage may reflect composition of parent rock.	Generally good to excellent foundation and constructional materials. Variable properties: Generally favourable foundation conditions except in humid and tropical climates where depth and rate of weathering are very great.
2.ORGANIC SOILS Formed in-place by growth and subsequent decay of plant and animal life	**Peat** A fibrous aggregate of decaying vegetation matter with dark colour and bad odour. **Muck** Peat with advanced stage of decomposition with no evidence of botanical character.	Highly plastic, very compressible. Entirely unsuitable for foundation and construction material.
3. TRANSPORTED SOILS **(i) Alluvial Soils** Materials transported and deposited by running water.	**Flood Plain Deposits** Soils laid down by a stream within that portion of its valley subject to inundation by flood water. **Point Bar** Alternating deposits of arcuate ridges and swales (lows) formed on the inside or converse bank of mitigating river bends. Ridge deposits consist primarily of silt and sand, swales are clay filled. **Channel Fill** Deposits laid down in abandoned meander loops isolated when rivers shorten their courses. Composed primarily of clay; however, silty and sandy soils are found at the u/s and d/s ends.	Generally favourable foundation conditions however, some underground anomalies may be present. Flow slides may be a problem along river banks. Soils are quite pervious. Fine-grained soils are usually compressible. Silty soils generally present favourable conditions.

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MAJOR SOIL TYPE	BRIEF DESCRIPTION WITH TYPICAL NAMES	TYPICAL ENGINEERING CHARACTERISTICS
	Back swamp The prolonged accumulation of flood water sediments in flood basins bordering a river. Soils are generally clays but tend to become silty near river bank.	Relatively uniform in horizontal direction. Clays are sensitive to seasonal volume changes.
	Alluvial Terrace Deposits Relatively narrow, flat-surfaced, river flanking remnants of flood plain deposits formed by entrenchment of rivers and associated processes.	Generally favourable foundation conditions.
	Estuarine Deposits Mixed deposits of marine and alluvial originally laid down in widened channels at mouths of rivers and influenced by tide of body of water into which they are deposited.	Generally fine-grained and compressible. Many local variations.
	Alluvial-Lacustrine Deposits Material deposited within lakes by waves, currents, and other organo-chemical processes. Unstratified organic clays at the center of the lake which gradually grade into the stratified field of silts and sands in peripheral zones.	Generally compressible. Uniform in horizontal direction.
	Delta Deposits Deposits formed at the mouth of rivers which result in extension of the shoreline.	Generally fine-grained and compressible. Many local variations of soil conditions.
(ii) Aeolian Soils Material transported and deposited by wind	**Loess** A calcareous, unstratified deposit of silt or sandy or clayey silt traversed by a network of tubes formed by root fiber newly decayed. Uniform particles of about ≤0.05 mm. thickness of deposits ranges from few cms to 30 to 50 m or more.	Stands vertically, collapsible on saturation. Deep weathering or saturation can modify properties. Colour light yellowish brown. High dry strength but decreases considerably on wetting. Cavities of few meter length due to remnant of vegetation are common.
	Sand Dunes Mounds, ridges, and hills of uniform fine sand characteristically exhibiting round grains.	Very uniform grain size, may exist in relatively loose condition.

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MAJOR SOIL TYPE	BRIEF DESCRIPTION WITH TYPICAL NAMES	TYPICAL ENGINEERING CHARACTERISTICS
4.GLACIAL SOILS Material transported and deposited by glaciers.	**Glacier Tills** An accumulation of debris, deposited underneath, at the side (lateral moraines) or at the lower limit of a glaciers (terminal moraines). Material lowered to ground surface in an irregular sheet by a melting water of glacier is called as ground moraine. **Glacio-Fluvial Deposits** Coarse and fine-grained soils deposited by streams of melt-water from glaciers. Materials deposited on ground surface beyond terminal of glacier is called as outwash plain. Gravel ridges are known as Kames and Eskers. **Glacio-Lacustrine Deposits** Material deposited within lakes by melt water from glaciers. Clays in central zones of lakes and alternate layers of silty clay or silt and clay (varved clay) in peripheral zones.	Consists of material of sizes in various proportions from boulders-gravels-sand to clay. Unstratified deposits. Generally favourable foundation conditions but rapid changes in conditions are common. Many local variations. Generally present favourable foundation conditions. Very uniform in a horizontal direction.
5. MARINE SOILS Materials transported and deposited by ocean waves and currents in shore and offshore areas.	**Shore Deposits** Deposits of sands and/or gravels formed by the transporting destructive and sorting action of waves on the shoreline. **Marine Clays** Organic and inorganic deposits of fine-grained materials.	Relatively uniform and moderate to high density Generally very uniform deposits, compressible and sensitive to remoulding.
6. COLLUVIAL SOILS Material transported and deposited by gravity	**Talus** Deposits formed by gradual accumulation of unsorted rock fragments and debris at base of cliffs. **Hill wash** Fine colluvial consisting of clayey sand, sand silt or clay. **Landslide Deposits** Considerable masses of soil or rock that have stopped down, more or less as units from their former position on steep slopes	Previous movement indicates possible future difficulties. Generally unsuitable foundation conditions.

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MAJOR SOIL TYPE	BRIEF DESCRIPTION WITH TYPICAL NAMES	TYPICAL ENGINEERING CHARACTERISTICS
7. PYROCLASTIC SOILS Materials ejected from volcanoes and transported by gravity, wind and air	**Ejecta Soils** Loose deposits of volcanic age, lapille, bombs etc. **Pumice** Frequently associated with lava flows and mud flows, or may be mixed with non volcanic sediments.	Typically shardlike particles of silt size with large volcanic debris. Weathering and redeposition from highly plastic, compressible clay. Unusual difficult foundation conditions.

QUESTIONS

1-1 Define the terms:

(i) Soil, (ii) Soil Mechanics, (iii) Geotechnical Engineer

1-2 Write a short note on historical development of Soil Mechanics.

1-3 What is the necessity of studying the subject of Soil Mechanics? Explain in brief. What are the uses of soil?

1-4 How the soil is formed in nature? Explain in brief the terms of Mechanical and Chemical weathering agents.

1-5 Explain the terms of residual soils and transported soils.

1-6 List the various soil types with respect to their modes of formation.