

**Iqra National University**

**Department of CIVIL ENGINEERING**

**Assignment**

**Geotechnical & Foundation Engineering (Lab)**

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Section: A

Program: Civil Engineering

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**Question: 01**

**What is the difference between Standard Proctor Test and Standard Penetration Test?**

**Standard Proctor Test:**

## Standard Proctor Test is basically a Compaction test of soil that is carried out using Proctor’s test to understand compaction characteristics of different soils with change in moisture content.

## Compaction is the process of densification of soil by reducing air voids. Compaction of soil is the optimal moisture content at which a given soil type becomes most dense and achieve its maximum dry density by removal of air voids.

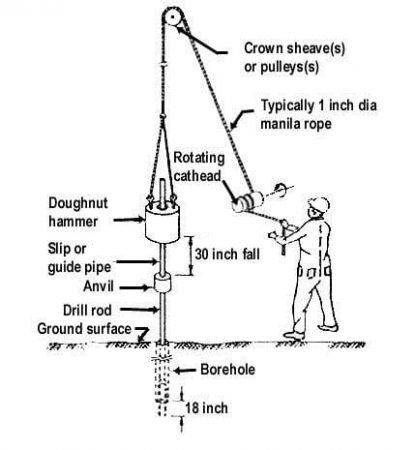
* The degree of compaction of a given soil is measured in terms of its dry density. The dry density is maximum at the optimum water content.



**Apparatus of Standard Proctor Test**

**Standard Penetration Test (SPT):**

* The standard penetration test is an in-situ test that comes under the category of penetrometer tests.
* The test is extremely useful for determining the relative density and the angle of shear resistance of cohesion-less soils. It can also be used to determine the unconfined compressive strength of cohesive soils
* The standard penetration tests are carried out in borehole. The test will measure the resistance of the soil strata to the penetration undergone.
* A penetration empirical correlation is derived between the soil properties and the penetration resistance.



**Sample of SPT picture with tools name mentioned**

**Question: 02**

**What is the Classification of Soil based on Free Swell Index?**

On the basis of Swell Index, Soil are classified as,

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Free Swell Index*** | ***Degree of Expensiveness*** | ***Liquid Limit*** | ***Plastic Limit*** | ***Shrinkage Limit*** | ***Degree of Severity*** |
| <20 | Low | 0.50 | 0-35% | <17% | Non-Crirical |
| 20-35 | Moderate | 40-60% | 25-50% | 8-18% | Marginal |
| 35-50 | High | 50-75% | 35-65% | 6-12% | Critical |
| >50 | Very High | >60% | >45% | <10% | Severe |

**Question: 03**

**Why is Permeability Test of Soil important?**

**Importance of Soil Permeability Test:**

Soil permeability test is a laboratory experiment conducted to determine the permeability of soil

Following Applications illustrates the importance of soil Permeability,

* Permeability influences the rate of settlement of a saturated soil under load.
* The design of earth dams is very much based upon the permeability of the soils used.
* The stability of slopes and retaining structures can be greatly affected by the permeability of the soils involved
* Filters made of soils are designed based upon their permeability