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**SEMESTER: 6TH**

**SECTION: A**

**SUBJECT: GEOTECINAL LAB (ASSIGNMENT)**

**INSTRUCTOR: MUNEEB KHAN**

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| **STANDARD PROCTOR TEST** | **STANDARD PENETRATION TEST** |
| 1.Definition:  It is the laboratory method of experimentally determining the optimal moisture content at which the given soil type will become most dense and acquire maximum dry density. | 1.Definition:  The standard penetration test (SPT) is an in-situ dynamic penetration test designed to provide information on the geotechnical engineering properties of soil |
| 2.Purpose:  It is a laboratory geotechnical testing method used which is used to determine the soil compaction properties, specifically, the optimal water content at which the soil acquires its maximum dry density. | 2.Purpose:  It is used for identification tests like specific gravity, grain size distribution, Atterberg Limit, compaction etc.  It’s also useful in finding relative density of cohesion less soil, angle of shearing resistance of cohesion less soil and unconfined compressive strength of cohesive soil. |
| 3. It was proposed by Proctor (1933) therefore known as Proctor Compaction test.  It’s easy to perform in laboratory due to workability of simple apparatus. | 3. This test is the most frequently used subsurface exploration drilling test performed worldwide |
| 4. Apparatus:  Standard proctor:  1/30ft3 mold  5.5 lb hammer  12” drop  3 layers of soil  25 blows / layer  Drying oven | 4. Apparatus:  Drilling equipment for boreholes  Split spoon sampler  Drive- weight assembly (hammer, driving head-anvil)  Cathead |

**QUESTION: 01**

**QUESTION: 02**

**Free Swell Index:**

Free Swell Index is the increase in volume of a soil, without any external constraints, on submergence in water

Based on free swell index the classification is done as follows:

|  |  |  |
| --- | --- | --- |
| Free Swell Index | Degree of expansiveness | PL |
| <20 | Low | 0-35% |
| 20-35 | Moderate | 25-50% |
| 35-50 | High | 35-65% |
| >50 | Very High | >45% |

**Question: 03**

**PERMRABILITY TEST:**

Permeability is the measure of the soil's ability to permit water to flow through its pores or voids.

It is one of the most important soil properties of interest to geotechnical engineers.

**IMPORTANCE**

Knowledge of the permeability properties of soil is necessary to:

1. Estimating the quantity of underground seepage

2. Solving problems involving pumping seepage water from construction excavation

3. Stability analyses of earth structures and earth retaining walls subjected to seepage forces

The following applications illustrate the importance of permeability in geotechnical design:

1. Permeability influences the rate of settlement of a saturated soil under load.

2. The design of earth dams is very much based upon the permeability of the soils used.

3. The stability of slopes and retaining structures can be greatly affected by the permeability of the soils involved.

4. Filters made of soils are designed based upon their permeability.