**TERM PAPER**

**ON**

**SOIL PERMEABILITY AND CAPILARITY**

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ABSTRACT

Soil mechanics is a branch of science that deals with the study of soil, its physical properties and applied mechanics that describes the behavior of soils.

Permeability is the measure of the soils ability to permit water to flow through its pours. it is the most important soil properties of interest to geotechnical engineers. It is a topic which can be useful to engineers in various ways which includes ;

Calculations of uplift pressure under hydraulic structure and their safety against piping.

Ground water flow towards wells and drainage soil

Calculations of seepage through the body of earth dams and stability of slopes

Determinations of rate of settlement of a saturated compressible soil layer.

Soil permeability is important in almost all fields of engineering.

Contents

[CHAPTER ONE 4](#_Toc37883697)

[Introduction 4](#_Toc37883698)

[Soil permeability: 4](#_Toc37883699)

[CHAPTER TWO 5](#_Toc37883700)

[Capillarity 5](#_Toc37883701)

[Soil capillarity: 5](#_Toc37883702)

# CHAPTER ONE

## Introduction

Permeability: refers to the movement of air and water through the soil, which is important because it affects the supply of root-zone-air, moisture, and nutrients available for plant uptake. Gravel is the most permeable soil. Clay is the most porous but least permeable soil. Clay usually acts as an aquitard, impending the flow of water. Gravel and sand are both porous and permeable.

Hydraulic conductivity of a soil also known as the coefficient of permeability of the soil describes how easily it is for a liquid to move through the soil. This factor can be affected by the viscosity, or factor can be affected by viscosity or thickness(fluidity) of a liquid and its density.

## Soil permeability:

This is the property of soil to transmit water and air.

#### Importance of permeability in a soil

* It influences the rate of settlement of a saturated soil under load.
* It aids in the design of dams.
* Understanding the permeability of a soil can be very helpful in constructing retaining structures.
* Aids in the design of soil filters
* Influences the flow of settlement of a saturated soil under load

#### Factors affecting the permeability of soil

Temperature

* Void ratio.
* Degree of saturation.
* Shape of particles.
* Structure of soil mass.
* Entrapped air and organic impurities.
* Absorbed water.
* Particle size.
* Temperature.
* Properties of pore water pressure

Permeability of a soil is tested in a laboratory by performing the constant head permeability test. The soils suitable for this tests, are gravel and sand. Soils with presence of silt in them cannot be tested with method.

# CHAPTER TWO

## Capillarity

This is the ability of liquid to flow in a narrow tube. The narrower the tube the higher the rise in liquid. It is the primary force which enables soil to retain water as well as to regulate its movement. It is the result of surface or inter facial forces. The rise of water in the tube is caused by forces of attraction between molecules of water and glass walls and among the molecules of water themselves.

### Soil capillarity:

The phenomenon of capillarity also occurs in soil. In the same way that water moves upward through a tube against the force of gravity, water moves upward through soil pores or the spaces between soil particles. Clay soil has a higher capillarity rate when compared to other soils. Capillarity increases with decrease in the size of soil particles.

Capillarity in soil enables the upward and horizontal movement of water within the soil profile, as opposed to downward movement caused by gravity. In addition also enables water retention.

##### Summary

Although permeability deals with the infiltration of water, fluids or liquids, capillarity deals with rise of water within the soil.

In engineering soils that do not allow the flow or passage of water through then are not good soils according to engineering standards because they are not good for building.