Soil Mechanics

Course Code	Credit Hours
CE-217	**2-1**

Course Description

This course provides an elementary introduction to Soil Mechanics and provides the basic mechanics necessary for the detailed study of Geotechnical Engineering. This course aims to provide an understanding of the nature of soils as engineering materials; common soil classification schemes; the importance of water in the soil and the effects of water movement; and the stress-strain-strength response of soils.

Text Book:

1. Das & Sobhan (2018). Principles of Geotechnical Engineering. 9th.
2. Das (2009). Fundamentals of Geotechnical Engineering. 3rd
3. Whitlow (2001). Basic soil mechanics, 4th.

Reference Book:

1. Mitchell & Soga (2005). Fundamentals of soil behavior, 3rd.
2. Holtz & Kovac (1981) An Introduction to Geotechnical Engineering.
3. Whitlow (2001) Basic Soil Mechanic
4. Terzaghi (1943) Theoretical Soil Mechanics.

Prerequisites :

Nil.

ASSESSMENT SYSTEM FOR THEORY

	Without Project (%)	With Project/Complex Engineering Problems (%)
Quizzes	15	10-15
Assignments	10	5-10
Mid Terms	25	25
Project	-	5-10
End Semester Exam	50	45-50

ASSESSMENT SYSTEM FOR LAB

Lab Work/ Psychomotor Assessment/ Lab Reports	70%
Lab Project/ Open Ended Lab Report/ Assignment/ Quiz	10%

Final Assessment/ Viva	20%

Teaching Plan

Week No	Topics/Learning Outcomes
1-2	**Introduction** • Introduction to soil mechanics and geotechnical engineering • Significance of geotechnical engineering • Soil formation, transportation, sorting, and deposition • Types of soil deposits and their properties Soil types, soil structure and clay minerals.
3-5	**Index and Physical Properties** • Basic physical and index properties of soil • Water content, void ratio, porosity, degree of saturation, air voids, unit weights, specific gravity etc. • Phase relationships, and numerical examples • Particle size and shapes, sieve Analysis, hydrometer Analysis. • Consistency and various states of fine-grained soils • Atterberg's limits Related numerical examples.
4-7	**Soil Classification Systems** • Importance of soil classification • Grain size distribution, gradation curves and interpretation • Soil classification systems, textural classification system, AASHTO soil classification system, Unified soil classification system, and description of their subgroups. Related numerical examples
9	**Mid Semester Exam**
10-12	**Compaction of soils** • Compaction of soils • Fundamentals of compaction • Standard and modified proctor compaction tests • Moisture density relationship • Compaction standards • Factor effecting compaction

	• Field control and measurement of in situ density and field compaction Numerical examples and assignments
13-14	**Permeability and Seepage** • Permeability and Seepage • Darcys's law • Factors affecting permeability • Laboratory and field determination of permeability • Seepage forces • Introduction to flow net Related numerical examples
15-16	**In-situ Stresses** Stress condition in soil: effective and neutral stresses, stresses in saturates soils with upward and downward seepages
17-18	**End Semester Exam**

Practical

Experiment No	**Description**
1	To determine moisture content of soil in laboratory
2	To determine specific gravity of fine-grained soils in the laboratory
3	To determine particle size distribution of soils using sieve and hydrometer analyses.
4	To determine Atterberg's consistency limits of soils
5	To determine laboratory compaction characteristics of soils using standard and modified Proctor compaction test procedures
6	To determine in-place/in-situ/field density of soils
7	To determine permeability of soils using standard constant head and falling head permeability tests