

**COURSE CODE:** CE-223  
**COURSE NAME:** Soil Mechanics  
**CREDIT HOURS:** Theory = 3 Practical = 1 Total = 4  
**CONTACT HOURS:** Theory = 48 Practical = 48 Total = 96  
**PREREQUISITE:** None  
**MODE OF TEACHING:**

Instruction: Three hours of lecture per week 75 %  
Practical/ Laboratory Demonstration: Two hours of Lab work per week 25 %

### **COURSE DESCRIPTION:**

This course focuses on different classification methods, grading, and properties of soil. Important Soil tests, procedure, and their applications. In depth knowledge, understanding, and application of the principles governing soil mechanics. The course also includes the practical project in which the students come up with innovative ideas and learn to work as team and on individual basis.

### **RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):**

The course is designed so that students will achieve the PLOs:

- |                                    |                                     |                                   |                          |
|------------------------------------|-------------------------------------|-----------------------------------|--------------------------|
| 1 Engineering Knowledge:           | <input type="checkbox"/>            | 7 Environment and Sustainability: | <input type="checkbox"/> |
| 2 Problem Analysis:                | <input checked="" type="checkbox"/> | 8 Ethics:                         | <input type="checkbox"/> |
| 3 Design/Development of Solutions: | <input type="checkbox"/>            | 9 Individual and Teamwork:        | <input type="checkbox"/> |
| 4 Investigation:                   | <input checked="" type="checkbox"/> | 10 Communication:                 | <input type="checkbox"/> |
| 5 Modern Tool Usage:               | <input type="checkbox"/>            | 11 Project Management:            | <input type="checkbox"/> |
| 6 The Engineer and Society:        | <input type="checkbox"/>            | 12 Lifelong Learning:             | <input type="checkbox"/> |

### **COURSE LEARNING OUTCOMES:**

Upon successful completion of the course, the student will demonstrate competency by being able to:

Sr. No.	CLO	Domain	Taxonomy Level	PLO
1	<b>UTILIZE</b> engineering knowledge in soil mechanics for engineering application	Cognitive	3	-
2	<b>MAKE USE OF</b> techniques in soil mechanics for environmental problem solution	Cognitive	3	2
3	<b>DEMONSTRATE</b> basic principle/laws and field tests of soil mechanics	Psychomotor	3	4
4	<b>Maintain</b> ethical conduct in lab and adhere to lab safety procedures while contributing effectively towards individual and/ or group goals.	Affective	5	9

#### TOPICS COVERED:

Week	Topic	Reading Assignment/ Homework	CLO #
1	Introduction to Soil mechanics, Soil, rock and their types and formation	Chapter 1	1
2	Physical properties of soil	Chapter 1 Quiz 1	2
3-4	Soil Classification Systems (AAHSTO & USCS)	Chapter 2 Assignment 1	1
5	Soil Exploration	Chapter 2 Quiz 2	2
6	Soil sampling, Soil Compaction	Chapter 3	
7	Standard proctor and modified	Chapter 4 Quiz 3	2
8	Soil pollution, reclamation techniques	Chapter 5 Assignment 2	1
9	<b>Mid Semester Exam</b>		
10	Stresses in Soil	Quiz 4	2
11	Permeability /Seepage Permeability of stratified soils	Assignment 3	2

12-13	Fundamental concepts and definitions moisture-density relationship (OMC Curve), compaction standards (Proctor Test), factors affecting compaction, field moisture control and measurements of in-situ density	Quiz 5	2
14	Mechanics of consolidation, theory of one-dimensional consolidation, assumptions and validity, types of foundations	Assignment 4 Quiz 6	1,2
15	Projects submission/ Presentation		
16	Revision		
<b>ESE</b>			

### LIST OF PRACTICALS:

### TEXT AND MATERIAL:

#### Textbook (s)

- a. R. Whitlow, Basic Soil Mechanics, Fourth Edition, 2005, Prentice Hall,
- b. Introduction to Soil Mechanics by Baraja M. Das. 2013.

#### References Material:

- a. An Introduction to Geotechnical Engineering by Holtz and Kovac.
- b. Karl Terzaghi, Theoretical Soil Mechanics, Seventh Printing, 1954, John

S/No	Practical's list
1	(A)Moisture Content of Soil (oven dry method)
2	(B)Moisture Content of Soil (speedy moisture)
3	Sieve Analysis of Soil
4	Hydrometer Analysis of Soil
5-6	(A)Liquid limit and Plastic Limit test of Soil (Casagrande Method)
7	(B)Liquid limit test (cone penetrometer)
8	Shrinkage limit of Soil
9	Specific Gravity of Soil
10	Compaction Test (Standard and Modified)
11	(A)In-situ density of soil (sand replacement method)
12	(B)In-situ density of soil (core cutter method)
13	(C)In-situ density of soil (by Balloon Apparatus)
14	(A)Permeability test of Soil (constant head)/ (falling head)
15	<b>ESE</b>

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**ASSESSMENT SYSTEM:**

<b>Theoretical/Instruction</b>	<b>75%</b>
Assignments	10%
Quizzes	15%
Mid Semester Exam	25%
End Semester Exam	50%
<b>Practical Work</b>	<b>25%</b>
Lab Attendance	20%
Lab Report	20%
Lab Quiz	30%
Lab Rubrics	30%
<b>Total</b>	<b>100%</b>