

GEOTECHNICAL ENGINEERING LABORATORY

VI Semester: CE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACEB20	Core	L	T	P	C	CIA	SEE	Total
		-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 24			Total Classes: 24			
I. COURSE OVERVIEW:								
The Geotechnical Engineering Laboratory intends to train the students in the field of testing of soils to determine their physical, index and engineering properties. This course enables the students to perform the most important tests including: soil classification, compaction, permeability, direct shear testing and cyclical triaxial testing; each experiment of soil testing is presented with brief introduction covering the important details of the experiment, the theory and the purpose for which it is to be performed, followed by the detailed explanation of apparatus required, procedure and specimen calculations.								
II. OBJECTIVES:								
The course should enable the students to:								
I The concept behind the soil formation, type soil and the relationships between the soil mass and volume of voids and enables the students to perform moisture content, specific gravity and Waterberg limits.								
II The procedure for soil classification through grain size distribution and classification of soil according to IS code.								
III The importance of determining the permeability and enables the students to perform permeability (constant head and variable head) test; so that students can estimate ground water flow, seepage through dams, rate of consolidation and settlement of structures.								
IV The behavior of soil under different loading condition and enable the students derive the bearing capacity, design retaining walls, evaluate the stability of slopes and embankments, etc.								
III. COURSE OUTCOMES:								
LIST OF EXPERIMENTS								
Week – 1	MOISTURE CONTENT							
To determine the natural moisture content of the given soil sample.								
Week – 2	SPECIFIC GRAVITY							
Determine the specific gravity of soil fraction passing 4.75 mm I.S sieve by density bottle.								
Week – 3	ATTERBERG'S LIMITS							
To determine liquid limit, plastic limit, shrinkage limit, classify the soil and to find flow index and toughness index								
Week – 4	FIELD DENSITY- CORE CUTTER AND SAND REPLACEMENT METHOD							
To determine the mass density of soils by core cutter method and replacement method								
Week – 5	GRAIN SIZE ANALYSIS							
To classify the Coarse Grained soils based on sieve analysis								
Week – 6	PERMEABILITY OF SOIL: CONSTANT AND VARIABLE HEAD TEST							
To determine coefficient of permeability of given soil sample at desired density by a suitable method.								
Week – 7	COMPACTION TEST							
To determine the optimum moisture content and maximum dry density of a soil by proctor test.								
Week - 8	CBR TEST							
To determine the California bearing ratio by conducting a load penetration test in the laboratory.								

Week – 9	CONSOLIDATION TEST
To determine the settlements due to primary consolidation of soil by conducting one dimensional test.	
Week – 10	UNCONFINED COMPRESSION TEST
To determine the unconfined compressive strength of cohesive soil sample and its sensitivity	
Week – 11	TRIAxIAL COMPRESSION TEST
To determine shear strength parameter i.e. angle of shearing resistance and cohesion of a given soil Sample	
Week – 12	DIRECT SHEAR TEST
To determine shear strength parameters of the given soil sample at known density and moisture content by direct shear test.	
Week – 13	VANE SHEAR TEST
To determine the shear strength of clay specimen.	
Text Books:	
1. Braja M. Das, “Soil Mechanics Laboratory Manual”, Engineering Press at OUP, 2001. 2. Michael E. Kalinski, “Soil Mechanics Lab Manual”, John Wiley & Sons, 2006.	
Reference Books:	
1. Head, “Manual of Soil Lab Testing: Effect. Stress Tests”, CBS Publishers, 1997.	
Web References:	
1. http://home.iitk.ac.in/~madhav/geolab.html 2. http://www.ammini.edu.in/Uploads/Lab_Manuals/CE09%20607(P)_%20Geotechnical%20Engineering%20Lab.pdf	