

GEOTECHNICAL ENGINEERING LABORATORY

IV Semester: CE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACE105	Core	L	T	P	C	CIA	SEE	Total
		-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
OBJECTIVES: The course should enable the students to: I. Classify the soil based on index properties of soil II. Find the field bulk and dry density of cohesion-less and cohesive soils III. Find the coefficient of permeability of coarse grained and fine grained soils & compressibility characteristics of soil IV. Evaluate the shear strength parameters of soil								
COURSE LEARNING OUTCOMES (CLOs): The students should enable to: 1. Calculate water content of the soil 2. Determine the Specific Gravity of the soil 3. Classify the Coarse grained soils based on sieve analysis test & grain size distribution curve 4. Determine the liquid limit of fine grained soils & plot flow curve for a given soil 5. Determine the plastic limit of fine grained soils 6. Classify the fine grained soils based on plasticity index and liquid limit of soil 7. Determine the field bulk and dry density of cohesive soils by Core Cutter method 8. Determine the field bulk and dry density of cohesion-less soils by Sand Replacement method 9. Determine the permeability of coarse grained soil by constant head permeability test 10. Determine the permeability of fine grained soil by falling head permeability test. 11. Determine unconfined compressive strength of soil 12. Determine California bearing ratio of the soil 13. Determine maximum dry density and optimum moisture content of the soil by standard proctor test. 14. Determine the shear strength parameters of soil by direct shear test 15. Determine the un-drained shear strength of soft clays 16. Determine the coefficient of Consolidation of the soil by consolidation test 17. Determine coefficient of volume compressibility by consolidation test 18. Determine the un-drained shear strength parameters of soil by tri-axial shear test 19. Determine the drained shear strength parameters of soil by tri-axial shear test 20. Determine the SPT N value of the soil by standard Penetration Test.								
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	RELATIVE DENSITY
To determine the relative density of given coarse grained material	
Week-5	FIELD DENSITY- CORE CUTTER AND SAND REPLACEMENT METHOD
To determine the mass density of soils by core cutter method and replacement method	
Week-6	GRAIN SIZE ANALYSIS
To classify the coarse grained soils based on sieve analysis	
Week-7	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-8	COMPACTION TEST
To determine the optimum moisture content and maximum dry density of a soil by proctor test.	
Week-9	CBR TEST
To determine the California bearing ratio by conducting a load penetration test in the laboratory.	
Week-10	CONSOLIDATION TEST
To determine the settlements due to primary consolidation of soil by conducting one dimensional test.	
Week-11	UNCONFINED COMPRESSION TEST
To determine the unconfined compressive strength of cohesive soil sample and its sensitivity	
Week-12	TRIAxIAL COMPRESSION TEST
To determine shear strength parameter i.e. angle of shearing resistance and cohesion of a given soil sample	
Week-13	DIRECT SHEAR TEST
To determine shear strength parameters of the given soil sample at known density and moisture content by direct shear test.	
Week-14	VANE SHEAR TEST
To determine the shear strength of clay specimen.	
Week-15	STANDARD PENETRATION TEST
To measure the resistance to penetration of a sampling spoon in soil under dynamic loading	
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	