Program : **Diploma in Civil Engineering**	
Course Code : **4019**	Course Title: **Geotechnical Engineering Lab**
Semester : **4**	Credits: **Nil**
Course Category: **Program Core**	
Periods per week: **3 (L:0, T:0, P:3)**	Periods per semester: **45**

Course Objectives:

- To provide hands-on experience with the laboratory tests used for determination of physical, index and Engineering properties of soil.
- To enable students to identify and classify different types of soil.

Course Prerequisites:

Topic	Course code	Course name	Semester
Knowledge of basic Mathematics		Engineering Mathematics	2
Basics of soil mechanics		Geotechnical Engineering	4

Course Outcomes:

On completion of the course, the student will be able to:

COn	Description	Duration (Hours)	Cognitive level
CO1	Determine physical and index properties of soil.	20	Applying
CO2	Estimate the permeability and shear strength of soil.	9	Understanding
CO3	Illustrate the procedure for conducting consolidation test and field methods of determination of bearing capacity.	6	Understanding
CO4	Illustrate various compaction methods for soil stabilization.	6	Understanding
	Lab test	4	

CO – PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1				3			
CO2				3			
CO3				3			
CO4				3			

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**Determine physical and index properties of soil.**		
M1.01	Determine water content of given soil sample by oven drying method as per IS: 2720 (Part- II).	1	Understanding
M1.02	Determine specific gravity of soil by pycnometer method as per IS 2720 (Part- III).	2	Understanding
M1.03	Determine dry unit weight of soil in field by core cutter method as per IS 2720 (Part- XXIX).	3	Understanding
M1.04	Determine dry unit weight of soil in field by sand replacement method as per IS 2720 (Part- XXVIII).	3	Understanding
M1.05	Determine Plastic and Liquid Limit along with Plasticity Index of given soil sample as per IS 2720 – 1985 (Part- V).	2	Understanding
M1.06	Determine Shrinkage limit of given soil sample as per IS 2720 (Part- V).	2	Understanding
M1.07	Determine grain size distribution of given soil sample by wet and dry sieve analysis as per IS 2720 (Part- IV).	3	Understanding
M1.08	Determine grain size distribution of given fine grained soil sample by Hydrometer analysis as per IS 3104 -1982	3	Understanding
M1.09	Classify soil by conducting field tests through Visual inspection.	1	Applying

CO2	**Estimate the permeability and shear strength of soil.**		
M2.01	Determine coefficient of permeability by constant head test as per IS 2720 (Part- XVII).	1.5	Understanding
M2.02	Determine coefficient of permeability by falling head test as per IS 2720 (Part- XVII).	1.5	Understanding
M2.03	Determine shear strength of soil by direct shear test as per IS 2720 (Part-XIII).	3	Understanding
M2.04	Determination of Unconfined compressive strength by conducting Unconfined Compression test as per IS 2720 -1991 (Part X)	3	Understanding
	Lab Test	2	
CO3	**To illustrate the procedure for conducting consolidation test and field methods of determination of bearing capacity.**		
M3.01	Determination of coefficient of consolidation by conducting consolidation test as per IS 2720-1986 (Part XV)	3	Understanding
M3.02	Prepare a detailed report on plate load test after conducting a site visit	1.5	Applying
M3.03	Prepare a detailed report on Standard Penetration Test after conducting a site visit	1.5	Applying
CO4	**To illustrate various compaction methods for soil stabilization.**		
M4.01	Determine MDD and OMC by standard proctor test of given soil sample as per IS 2720 (Part-VII).	3	Applying
M4.02	Determination of CBR value on the field as per IS2720 (Part - XVI).	3	Understanding
	Lab Test	2	

Text / Reference:

T/R	Book Title/Author
T1	Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publication, Delhi.
T2	Gopal Ranjan &A.S.R.Rao, Basic and applied soil mechanics, New Age International
T3	Arora K R, Soil Mechanics and Foundation Engineering, Standard Publisher.
R1	Murthy, V.N.S., A text book of soil mechanics and foundation Engineering, CBS Publishers & Distributors Pvt. Ltd., New Delhi.
R2	Ramamurthy, T.N. &Sitharam,T.G., Geotechnical Engineering(Soil Mechanics), S Chand and Company LTD., New Delhi.
R3	Raj, P. Purushothama, Soil Mechanics and Foundation Engineering, Pearson India, New Delhi.
R4	Kasamalkar, B. J., Geotechnical Engineering, Pune Vidyarthi GrihaPrakashan, Pune.

Online Resources:

Sl No	Website Link
1	https://www.nptel.ac.in/courses/105106142
2	https://nptel.ac.in/courses/105101160
3	https://www.nptel.ac.in/courses/105101001
4	https://law.resource.org/pub/in/bis/S03
5	https://www.astm.org/Standards/geotechnical-engineering-standards.html