Course Modules of the Subject Taught For the Session Aug-Dec 2025-26 (ODD SEM)

Course Syllabi with CO's

Faculty Name : **SHRUTHI H G**			Academic Year: **2025-26**				
Department: **CIVIL ENGINEERING**							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
BCV502	**Basic Geotechnical Engineering**	**CORE**	**Engineering Geology**	**3**	**-**	**-**	**40**
Objectives	The objectives of this course is to make students to learn: 1. Appreciate basic concepts of soil mechanics as an integral part in the knowledge of civil engineering. 2. Comprehend basic engineering and mechanical properties of different types of soil. 3. Become broadly familiar with geotechnical engineering problems such as, flow of water through soil medium and terminologies associated with geotechnical engineering. 4. Assess the improvement in mechanical behaviour by densification of soil deposits using compaction. 5. Model and measure strength-deformation characteristics of soils.						

Topics Covered as per Syllabus

Module-1

INDEX PROPERTIES AND IS CLASSIFICATION: Index Properties: Phase Diagram, definitions, and their interrelationships. Determination of Index properties, Types of soil structures and Clay Minerals, IS soil classification of Soil.

Module-2

SOIL WATER-EFFECTIVE STRESS ANALYSIS: Soil Water: Permeability, Darcy's law-assumption and validity, coefficient of permeability and its determination (only laboratory method), permeability of stratified soils. Capillary phenomenon, Flow net characteristics and applications.

Effective Stress Analysis: Effective stress concept-total stress, effective stress and Neutral stress

Module-3

COMPACTION AND CONSOLIDATION: Compaction: Principle of compaction, Standard and Modified proctor's compaction tests, factors affecting compaction, effect of compaction on soil properties, Field compaction control Mass-spring analogy, Terzaghi's one dimensional consolidation theory (No derivation).

Consolidation characteristics of soil (Cc, av, mv and Cv). Laboratory one dimensional consolidation test, Pre-consolidation pressure and its determination by Casagrande's method.

Module-4

SHEAR STRENGTH: Concept of shear strength, Mohr–Coulomb Failure Criterion, Modified Mohr–Coulomb Criterion, Total and effective shear strength parameters, Measurement of shear strength parameters - Direct shear test, unconfined compression test, triaxial compression test and field Vane shear test, Factors affecting shear strength of soils.

Module-5

BEARING CAPACITY AND SETTLEMENT: Bearing Capacity: Types of foundations, Determination of bearing capacity by Terzaghi's and BIS methods (IS: 6403), Modes of shear failure, Factors affecting Bearing capacity of soil. Effect of water table and load eccentricity on bearing capacity of soil, Field methods of determining bearing capacity of soil (SPT and plate load test).

Settlement: Types of settlements and importance, Computation of immediate and consolidation settlement, permissible differential and total settlements (IS 8009 Part 1).

List of Text Books

1. Gopal Ranjan and Rao A.S.R., Basic and Applied Soil Mechanics, New Age International (P) Ltd., New Delhi. 2016
2. Murthy V.N.S., Principles of Soil Mechanics and Foundation Engineering, UBS Publishers and Distributors, New Delhi. 2018
3. Braja, M. Das, Geotechnical Engineering; Thomson Business Information India (P) Ltd., India. 2015

4. Punmia B C, Soil Mechanics and Foundation Engineering, Laxmi Publications co., New Delhi. 2017
5. Soil Testing for Engineers by S. Mittal and J.P. Shukla 2020 Braja, M. Das, Geotechnical Engineering; Thomson Business Information India (P) Ltd., India.

List of Reference Books

1. T.W. Lambe and R.V. Whitman, Soil Mechanics-, John Wiley & Sons. 1991
2. Donald P Coduto, Geotechnical Engineering- Phi Learning Private Limited, New Delhi. 2010
   Shashi K. Gulathi & Manoj Datta, Geotechnical Engineering-Tata McGraw Hill Publications. 2010
3. Bowles J E, Foundation analysis and design, McGraw- Hill Publications 5th edition 2001
4. Malcolm D Bolton, "A Guide to soil mechanics", Universities Press., 2003
5. Manual of Soil Laboratory Testing- Head K.H., (1986)- Vol. I, II, III, Princeton Press, London 2006

URLs : https://nptel.ac.in/courses/105/105/105105168/
https://nptel.ac.in/courses/105/106/105106142/

Course Outcomes	**After the completion of the course the student will be able to ,**
	1. Comprehend the fundamentals of Soil mechanics and identify and classify the soil
	2. Apply the knowledge to determine MDD and OMC and compute consolidation properties and shear parameters of soil and compute the settlement and bearing capacity of soil
	3. Apply the knowledge to determine shear parameters of soil and compute the settlement and bearing capacity of soil
	4. Carry out experiments to assess the index properties of soil and determine Compaction, Permeability and Shear Strength characteristics of soil.

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Subject Code:	**BCV502**	TITLE: **GEOTECHNICAL ENGINEERING**				Faculty Name:		**SHRUTHI H G**			
List of Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	2	2	-	-	-	-	1	1	-	-	-	1
CO-2	2	2	2	2	-	2	1	1	-	-	-	1
CO-3	3	2	2	2	-	2	1	1	-	-	-	1
CO-4	3	2	2	2	-	2	1	1	-	-	-	1

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribution

The Correlation of Course Outcomes (CO's) and Program Specific Outcomes (PSO's)

Subject Code:	**BCV502**	TITLE: **GEOTECHNICAL ENGINEERING**	Faculty Name:	**SHRUTHI H G**
List of Course Outcomes	Program Specific Outcomes			
	PSO1		PSO2	
CO-1	1		0	
CO-2	1		0	
CO-3	1		0	
CO-4	1		0	
CO-5	1		0	

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribution