GEOTECHNICAL ENGINEERING– II

(SYLLABUS)

Course Code	23CE3701	Year	IV	Semester	I
Course Category	Professional Core	Branch	CIVIL	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	GTE– I
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks:	100

Course Objectives:

The objective of this course is to:

1. To impart knowledge on soil exploration methods, field tests, and soil investigation reporting for geotechnical analysis.
2. . To develop understanding of bearing capacity, settlement behavior, and design principles of shallow and deep foundations.
3. To enable analysis of earth pressure and slope stability problems under various soil and loading conditions.

Course Outcomes:

Course will enable the student to:

CO	Statement	Blooms level
CO 1	Apply soil exploration methods and interpret test data for geotechnical analysis.	**L3**
CO 2	Analyze bearing capacity of soils using theoretical and empirical methods.	**L4**
CO 3	Determine allowable bearing pressure and settlements of shallow foundations.	**L4**
CO 4	Design shallow and pile foundations based on load and soil conditions.	**L4**
CO 5	Analyze slope stability and earth pressure problems using standard methods.	**L4**

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2		3	2	1	1			1	1	3	2
CO2	3	3	1	2	1					-	1	3	1
CO3	3	3	2	2	1					-	1	3	1
CO4	3	3	3	2	2					2	1	3	2
CO5	3	3	2	3	1	2				-	1	3	2

Syllabus

Unit No	Content	Mapped COs
I	**Soil Exploration:** Need –-Methods of soil exploration – Depth of exploration-Boring and Sampling methods — Standard Penetration test- Cone penetration test-Plate load test- Preparation of soil investigation report **Earth Pressure:** Types-theories- Rankine's & Coulomb's theory of earth pressure – Culmann's graphical method - earth pressures in layered soils.	**CO1, CO5**
II	**Shallow Foundations:** Types-choice of foundation-Location of Depth-Bearing Capacity– factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory- Meyerhof theory- Skempton's theory-IS Methods – effect of water table.	**CO2, CO3**
III	**Allowable bearing pressure and settlements**: Shallow Foundations-Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures. **Design of Shallow Foundations**: Proportioning of footings for Equal Settlement — Combine footing -- Rectangular, Trapezoidal and Strap footing – Principles of Design of Raft Foundation.	**CO2, CO3, CO4**
IV	**Pile Foundation:** Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load test - Load carrying capacity of pile groups in sands and clays – Negative Skin Friction.	**CO3, CO4**
V	**Stability of Slopes:** Types Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Bishop's method -- Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions.	**CO2, CO5**

Learning Resource(s)

Text Book(s)

1. 'Principles of Foundation Engineering' by Das, B.M., - (2011) –6th edition (Indian edition) Cengage learning
2. 'Basic and Applied Soil Mechanics' by Gopal Ranjan& ASR Rao, New Age International Pvt. Ltd, (2004).
3. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi

Reference Book(s)

1. Foundation Analysis and Design' by Bowles, J.E., (1988) – 4th Edition, McGraw-Hill Publishing Company, Newyork.
2. 2. 'Theory and Practice of Foundation Design' by N.N.SOM & S.C.DAS PHI Learning Private limited.

Web Materials:

1. SWAYAM-NPTEL