GEOTECHNICAL ENGINEERING-II

Course Code: 20CE1119

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Pre-requisites: Geotechnical Engineering–I

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Interpret soil properties by conducting various field and lab tests (L3)

CO2: Estimate lateral earth pressures on retaining walls and check the stability (L3)

CO3: Determine the stability of slopes (L3)

CO4: Assess the bearing capacity of soils using different methods for shallow foundations (L3**)**

CO5: Discuss various types of deep foundations and their applications (L2)

UNIT-I **(10 Lectures)**

SOIL EXPLORATION:

Need – Methods of Soil exploration – Boring and Sampling Methods– Field tests – Penetration Tests – Standard Penetration Test – Cone Penetration Test – Plate Load Test – Pressure meter Test – Planning of exploration program and Preparation of Soil investigation report.

Learning outcomes:

At the end of the unit, the student will be able to

1. discuss different methods of soil exploration (L2)
2. compute the settlements using the plate load test (L3)
3. explain the preparation of a soil investigation report (L2)

UNIT-II **(10 Lectures)**

EARTH SLOPE STABILITY:

Infinite and finite earth slopes – Types of failures – Factor of safety of slopes – Stability analysis by method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

Learning outcomes:

At the end of the unit, the student will be able to

1. estimate the factor of safety of slopes (L2)
2. analyse the failure surface using different methods (L3)
3. apply the stability methods for different conditions (L3)

UNIT-III **(10 Lectures)**

EARTH PRESSURE THEORIES:

Rankine's theory of Earth pressure – Earth pressure due to layered backfill – Coulomb's Earth pressure theory, Stability of retaining wall.

Learning outcomes:

At the end of the unit, the student will be able to

1. summarize different conditions of earth pressure (L2)

2. explain the methods used for earth pressure (L2)
3. analyse the stability of a retaining wall (L3)

UNIT-IV **(10 Lectures)**

SHALLOW FOUNDATIONS:

Types – Choice of foundation –Depth of foundation – Safe Bearing Capacity – Terzaghi, Meyerhof, Skempton and IS Methods, Safe bearing pressure based on N- value – Settlement Analysis – Settlement from Plate Load Test data, Immediate and Consolidation Settlement.

Learning outcomes:
At the end of the unit, the student will be able to
1. classify different types of foundations (L2)
2. estimate the safe bearing capacity of soil using different methods (L2)
3. interpret the settlement criteria of foundations (L3)

UNIT-V **(10 Lectures)**

DEEP FOUNDATIONS:

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 – Settlement of pile groups. Well foundations-Shapes of well; Components of well foundation; Construction and Sinking of well; tilts and shifts.

Learning outcomes:
At the end of the unit, the student will be able to
1. distinguish between different types of piles (L2)
2. estimate load carrying capacity of pile groups (L2)
3. summarize the components of well foundation (L2)

Text Books:

1. Arora. K.R., "Soil Mechanics and Foundation Engineering", 5th Edition, Standard Publishers and Distributors, 2001.
2. Gopal Ranjan, Rao A.S.R., "Basic and Applied Soil Mechanics", 2nd Edition, New Age Intl. (P) Ltd., 2005.

References:

1. Das. B.M., "Principles of Geotechnical Engineering", 7th Edition, Cengage Learning, 2010.
2. Murthy V. N. S., "Textbook of Soil Mechanics and Foundation Engineering", 1st Edition, CBS Publishers, 2018.
3. Venkataramiah. C., "Geotechnical Engineering", 3rd Edition. New Age International Pvt. Ltd, 2008.

Web References:

1. https://onlinecourses.nptel.ac.in/noc22_ce96