GEOTECHNIQUES FOR INFRASTRUCTURE

II Semester

Course Code: 19CE2105

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Prerequisites: Geotechnical Engineering

Course Outcomes:

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

CO1 Outline the design approaches of Raft Foundation
CO2 Evaluate lateral capacity of piles.
CO3 Explain the concepts of foundations for transmission line towers.
CO4 Analyse the depth of bridge substructure
CO5 Develop the application of sheet pile walls and anchored bulkheads in Civil Engineering

UNIT-I: (10 Lectures)

RAFT FOUNDATIONS:

Design approaches-rigid foundation approach and flexible foundation approach. Stiffness or rigidity of soil structure system, relative stiffness factor of raft foundations, characteristic coefficient, calculation of bearing capacity of raft foundation\

Learning outcomes:

1. Discuss various elements of design of a raft foundation (L2)
2. Illustrate the design approaches for a raft foundation (L4)
3. Calculate the bearing capacity of raft foundation (L3)

UNIT-II: (10 Lectures)

PILE FOUNDATIONS:

Methods of determining lateral resistance of a single vertical pile - p-y method, Broms' method, Evans & Duncan's method, Determination of

lateral capacity of a pile group using Oteo's, Prakash & Saran's and Davisson's methods. Lateral pile load test.

Learning outcomes:

1. Explain the methods for determination of lateral capacity of Pile. (L2)
2. Illustrate the methods for determination of lateral resistance of a pile. (L4)
3. Compare the methods for single and group of pile for lateral loads (L5)

UNIT-III: (10 Lectures)

FOUNDATIONS FOR TRANSMISSION LINE TOWERS:

Forces on tower foundations, general design criteria, choice and type of foundation, stability analysis of tower foundations.

Learning outcomes:

1. Analyse the stability of tower foundation (L4)
2. Illustrate design criteria of foundation for transmission line towers (L4)
3. Illustrate the choice and types of foundations for transmission line towers (L4)

UNIT-IV: (10 Lectures)

BRIDGE SUBSTRUCTURES:

Elements, foundation types, maximum depth of scour, depth of foundation, allowable bearing pressure, loads, IRC : 45 - 1972 guidelines, types of well foundations, well sinking, tilts and shifts.

Learning outcomes:

1. Discuss IRC guidelines for bridge substructure (L2)
2. Illustrate the elements and types of a bridge substructure (L4)

3. Calculate depth of foundation for bridges (L5)

UNIT-V: (10 Lectures)

SHEET PILE WALLS AND ANCHORED BULKHEADS:

Materials used, types of sheet pile walls, analysis of cantilever sheet pile walls in cohesionless & cohesive soils, stability analysis of anchored bulkheads by free & fixed earth support methods.

Learning outcomes:

1. Illustrate materials and types of sheet pile walls (L4)
2. Analyse the stability of anchored bulkheads (L4)
3. Illustrate the anchored bulkheads by free & fixed support methods (L4)

Text Books:

1. Murthy,V,N,S, *Advanced Foundation Engineering*, 2 nd Edition, CBS Publication & Distribution, 2018.
2. Varghese, P.C., *Foundation Engineering*, 2 nd Edition, Prentice Hall of India, 2009.

References:

1. Bowles, J.E., *Foundation Analysis and Design*, 5 th Edition, McGraw Hill, 2006.
2. Purushotham Raj.P, *Soil Mechanics and Foundation Engineering*, 2nd Edition, Pearson Education, 2008.
3. Swami Saran, *Analysis and Design of Substructures*, 3 rd Ed., Oxford Publishers, 2006.