ADVANCED FOUNDATION ENGINEERING

(Professional Elective – III)

Course Code: 20CE1160 **L T P C**
3 0 0 3

Pre-requisites: Geotechnical Engineering I, Geotechnical Engineering II

Course Outcomes:
At the end of the course, the student will be able to:
CO1: Discuss the depth and spacing requirements and design principles of spread foundations
CO2: Explain about the design of mat foundations
CO3: Demonstrate the ability to identify a suitable deep foundation for heavily loaded Structures
CO4: Analyse the sheet pile walls
CO5: Analyse the stability of cofferdams

UNIT-I **(10 Lectures)**

SHALLOW FOUNDATIONS:

Depth, Spacing of footings, Erosion problems, Water table effects, Foundations on Sands, Silts, Clays, landfills (qualitative treatment only). Introduction to design of Spread footings, Rectangular footings, and eccentrically loaded spread footings, Basics of beams on elastic foundation and Ring foundations.

Learning outcomes:
1. Identify the factors affecting design of shallow foundations (L2)
2. Discuss about the design of different types of footings (L2)
3. Explain the concept of ring foundations (L2)

UNIT-II **(10 Lectures)**

MAT FOUNDATIONS:

Types, Bearing capacity, Settlements, Subgrade reaction, Design guidelines, piled rafts, soilstructure interaction.

Learning outcomes:
1. Summarize different types of mat foundations (L2)
2. Calculate the settlements in mat foundations (L2)
3. Discuss about the design guidelines of piled rafts (L2)

UNIT-III **(10 Lectures)**

DEEP FOUNDATIONS:

Stresses during pile driving, Tension piles, Negative skin friction. Guidelines for design of pilecaps, Batter piles, Drilled piers – Uses, load carrying capacity, Settlements.

Learning outcomes:

1. Summarize the stresses in pile driving and tension piles (L2)
2. Apply the design guidelines for pile caps (L3)
3. Explain the uses and settlements of drilled piers (L2)

UNIT-IV **(10 Lectures)**

SHEET PILE WALLS:

Cantilever sheet piles and Anchored bulkheads, Earth pressure diagram Determination of depthof embedment in sands and clays – Timbering of trenches- Earth pressure diagrams.

Learning outcomes:

1. Summarize different types of sheet pile walls (L2)
2. Determine the depth of embedment in different types of soils (L3)
3. Apply the concept of timbering of trenches (L3)

UNIT-V **(10 Lectures)**

COFFERDAMS:

Introduction – types of cofferdams - Design of cellular cofferdams by Tennessee Valley Authority (TVA) method – safety against sliding, slipping, overturning, vertical shear and stability against bursting.

Learning outcomes:

1. Summarize different types of cofferdams (L2)
2. Calculate the settlements of cofferdams (L3)
3. Determine the bearing capacity in cofferdams (L3)

TEXT BOOKS:

1. Das, B.M., "Principles of Foundation Engineering", 8th Edition, Cengage Learning,Singapore, 2014.
2. Bowles, J.E., "Foundation Analysis and Design", 5th Edition, McGraw- Hill International,1996.

REFERENCES:

1. Venkataramaiah C., "Geotechnical Engineering", 5th Edition, New Age InternationalPvt.Ltd, 2017.
2. Swami Saran, "Analysis and Design of Substructures", 3rd Edition, Oxford & IBHPublishing Company Pvt.Ltd, 2009.
3. Gopal Ranjan& Rao ASR, "Basics and Applied Soil Mechanics", 3rd Edition Reprint, NewAge International Pvt.Ltd, Publishers, 2016.