

4/4 B.Tech EIGHTH SEMESTER

CE8T4E ADVANCED FOUNDATION ENGINEERING

Credits: 3

Lecture: 3 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

Pre-requisites: Geo technology

Learning objectives:

- Understanding of problem soils and their bearing capacity limitations
- Imparting knowledge on settlement and consolidation of soils.
- Gaining capabilities on the design of foundations including for problem soils

Course outcomes:

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

1. Understand safe bearing capacity of soil
2. Determine settlement analysis of cohesive and cohesion less soil and consolidation
3. Understand soil related problems sheet piles and anchored & coffer dams
4. Design of different types of foundation & well foundation
5. Design deep foundation for expansive soil

UNIT-I

LOADING ON FOUNDATIONS

Effect of eccentric loading, inclined load, inclination of base of foundation, sloping ground; Bearing Capacity of stratified soils; Meyerhof analysis, Vesic's analysis and Hansen's analysis

UNIT-II

SETTLEMENT ANALYSIS

Contact pressure, sources of settlement, uniform settlement, differential settlement, construction practices to avoid differential settlement, immediate settlement in sands and clays-Terzaghi and Janbu's methods for clays, Schmertmann and Hartman method for cohesion less soils; consolidation settlement

THREE DIMENSIONAL CONSOLIDATIONS

Consolidation equation; Solution; Vertical sand drain analysis and design

UNIT-III

ANCHORED BULKHEADS

Earth pressure diagram, determination of depth of embedment in sands and clays; Types of bracing system, types of coffer dams

MACHINE FOUNDATIONS

Introduction; Terminology, Design criteria for machine foundation; single degree freedom system, free and forced vibration; Methods of analysis of block foundation; Dynamic subsoil investigation; Damping; Design and construction of foundation for reciprocating and impact type machines; Active and Passive isolation

UNIT-IV

CAISSONS AND WELL FOUNDATIONS

Types of caissons, different shapes of well, components of well, functions of wells, sinking of wells, lateral stability by Terzaghi analysis

UNIT-V

FOUNDATIONS IN EXPANSIVE SOILS

Problems associated with expansive soils, Swelling potential, percent swell, swell pressure factors affecting, methods of measurement of swell pressure ; Prediction of heave, factors affecting heave,

methods of prediction of heave; IS Classification of expansive soils, Under-reamed pile foundations, Sand cushion method, CNS layer method, granular pile-anchor technique, lime stabilization of expansive soils, Moisture control in expansive clays- Horizontal and vertical moisture barriers, sub-surface drainage and surface drainage, pre-wetting and ponding

Learning Resources:

Text books:

1. Soil dynamics and machine foundations – Swami Saran
2. Principles of Foundation Engineering(1999), B.M. Das., PWS Publishing Company, 4th edition, Singapore
3. Soil Mechanics and Foundation Engg (7th edition) by Dr. Arora, K.R., Standard Publisher and distributors, Delhi, 2010.
4. Hand book of Machine foundations – Srnivasulu and Vaidyanathan.

Reference books:

1. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Company.
2. Basic and Applied Soil Mechanics by Gopal Ranjan and ASR Rao, Wiley Eastern Limited, New Delhi.
3. Foundations of Expansive Soils, F.H. Chen. Elsevier Publications.
4. Geotechnical Engineering by SK Gulati & Manoj Datta, Tata McGraw- Hill Publishing Company Limited.

e-learning resources:

NPTEL