Geotechnical Engineering II - CE3350

Semester 1 (Jul-Nov) 2023

Instructors: Dali Naidu Arnepalli and Ramesh Kannan K
Slot: D (Mon 11 Hrs, Tue 10 Hrs, Wed 09 Hrs, Thu 13 Hrs)
Email: arnepalli@iitm.ac.in, rameshkk@iitm.ac.in
Place: offline (BSB 205/ 206)

Course Objectives:
To introduce the basic concepts, design principles, and design procedures for different geotechnical structures and interpret behavior under various loading conditions.

- Discuss the shear strength characteristics of soil
- Introduce fundamental tenets of earth pressure theories, foundation and slope stability analysis
- Utilising the principles/theories thus introduced to design various types of earth retaining structures, foundations and slopes

Learning Outcomes:
At the end of the course, students will be aware of various theories, principles and techniques available for the design of earth retaining structures, foundations and slopes. Specific outcomes are listed below.

- Understand the fundamental strength and deformation characteristics of soils
- Plan, conduct, prepare, and interpretation of soil investigation reports
- Design earth retaining structures for highway and railway bridges
- Design soil slopes for construction of earth dams, railway embankments, etc.
- Design building foundations in varying soil conditions

Course Outline:

1. Analysis of state of stress in soil
2. Failure theory; Shear strength of clays and sands
3. Site investigation and subsoil exploration
4. Earth pressure theories and retaining walls
5. Stability analysis; Sheet piles and its applications
6. Analysis of anchored wall
7. Bearing capacity of shallow foundations and deep foundations
8. Methods of construction

9. Slope stability: Methods of analysis
10. Types of failure and methods of analysis
11. Introduction to soil dynamics

Lectures:

Offline: Please regularly attend the lectures, discussions and quiz

WhatsApp group is created for discussions - Please join the group and post your queries.

References: The following are a restricted list of various interesting and useful books. Class notes and the books mentioned below will help you gain confidence in this course.

Text book:

- Knappett, J.A. and Craig, R.F. (2019). *Craig's Soil Mechanics*, 9th Edition, CRC Press, London, UK.

Reference books:

- Ranjan, G., and Rao, A. S. R. (2016). *Basic and applied soil mechanics*, 3rd Edition, New Age International Publishers, New Delhi, India
- Clayton, C. R., Woods, R. I., Bond, A. J., and Milititsky, J. (2014). *Earth pressure and earth-retaining structures.* CRC press.
- Holtz, R. D., Kovacs, W. D., and Sheahan, T. C. (2010). *An Introduction to Geotechnical Engineering*, 2nd Edition, Pearson pubs.
- Das, B. M. (2010). *Principles of Geotechnical Engineering*, Cengage Learning.
- Das, B. M. (2015). *Principles of foundation engineering.* Cengage learning.
- Mair, R. J., and Wood, D. M. (2013). *Pressuremeter testing: methods and interpretation.* Elsevier.
- Murthy, V. N. S. (2003). *Geotechnical engineering: principles and practices of soil mechanics and foundation engineering.* CRC press.
- Powrie, W. (2018). *Soil mechanics: concepts and applications.* CRC Press.
- Coduto, D. P., Yeung, M. R., and Kitch, W. A. (2011). *Geotechnical Engineering Principles and Practices*, Pearson Education Inc., New Jersey.
- Bowles, J. E. (1996). *Foundation Analysis and Design*, McGraw-Hill International, Singapore.
- Fang, H. Y. (1997). *Foundation Engineering Handbook (Second Edition)*, Chapman & Hall, Inc., New York.
- Terzaghi, K., Peck, R. B., and Mesri, G. (1996). *Soil Mechanics in Engineering Practice (Third edition).* John Wiley & Sons, Inc., New York.
- All Relevant Indian Standard (IS) codes and related international guidelines.

Prerequisites: An undergraduate course - CE2060: Geotechnical Engineering I

Grading Policy: Assignments/tutorials/weekly quiz (30%), Midterm (30%), Final exam (40%).

Teaching Assistant:

- Nitish Kumar — ce20s009@smail.iitm.ac.in — +91 80790 59978.
- Pavan Kalyan NSS — ce19d201@smail.iitm.ac.in — +91 98488 32985.

Class Policy:

- Attend all the lectures, quizzes and exams
- Submit the assignments and tutorials on or before the due date using the submission link provided
- Please solve more problems other than the assignments and tutorials
- All the activities will be considered for your final grading

Academic Honesty: Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation.