

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE4510 – Dynamics of Foundations

Credit Distribution: C:9 L:3 T:0 P:0 E:0 O:6 TH:0

Course Type: Theory

Description: Nil

Course Content:

Introduction: Sources of vibration, Distinction between static and dynamic problems, Nature of different types of dynamic loads, Significance of soilstructure interaction; Basic principles of soil dynamics – An Introduction; Fundamentals of vibration theory: Response analysis of SDOF and MDOF systems subjected to harmonic and aperiodic motions, Transmissibility; Programming using MATLAB: Examples and Problems; Wave propagation – 2D and 3D Analyses: Examples and Problems; Dynamic soil properties: Lab and field determination; Vibration analysis of footings using simple physical models; Effective stiffness and damping: Footings and rafts, Dynamic stiffness of foundations; Impedance functions: Effect of foundation embedment, Mathematical models, Examples; Introduction to analysis and design of machine foundations: Reciprocating and rotary machines, Vibration isolation techniques.

Text Books: Nil

Reference Books

- Das, B. M. and Ramana, G. V. (2010). Principles of Soil Dynamics, 2 Edition, Cengage Learning, Florence, KY.
- Prakash, S. and Puri, V. K. (1988). Foundation for Machines: Analysis and Design, John Wiley and Sons, NYYork.
- Prakash, S. (1981). Soil Dynamics, McGraw-Hill, New York.
- Thomson, W. T. and Dahleh, M. D. (1998). Theory of Vibration with Applications, Pearson Edn Inc., New Delhi.
- Rao, S. S. (2010). Mechanical Vibrations, Prentice Hall, Englewood Cliffs, New Jersey.
- Barkan, D. D. (1962). Dynamics of Bases and Foundations, McGraw-Hill, New York.
- Kameswara Rao, N. S. V. (1998). Vibration Analysis and Foundation Dynamics, Wheeler Publications, New Delhi.
- Richart, F. E., Hall, J. R. and Woods, R. D. (1970). Vibrations of Soils and Foundations, Prentice Hall, Englewood Cliffs, New Jersey.
- Arya, S. D., O’Neil, M. and Pincus, G. (1979). Design of Structures and Foundations for Vibrating Machines, Gulf Publishing Co., Houston, USA.
- Chowdhury, I. and Dasgupta, S. P. (2009). Dynamics of Structure and Foundation - A Unified Approach I. Fundamentals and II. Applications, CRC Press, Boca Raton.
- Wolf, J. P. (1994). Foundation Vibration Analysis Using Simple Physical Models, Prentice Hall, Englewood Cliffs, New Jersey.

- Wolf, J. P. and Deeks, A. J. (2005). Foundation Vibration Analysis: A Strength of Materials Approach, Elsevier, London.

Prerequisite: NIL