Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE5380-Structural Design Of Foundations

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

Course Type: Theory

Description: To enable learning of integrated approach to design of reinforced concrete foundations of structures including concepts of soil mechanics..

Course Content: Soil properties: review of index properties, shear strength, consolidation of soil 2. Bearing capacity: penetration tests, footings on layered soil, footings on slopes 3. Settlement and liquefaction: immediate settlement, consolidation settlement, effect of earthquake 4. Lateral earth pressure: earth pressure theories; effects of water table, layered soil and earthquake 5. Design considerations for foundations: Size and spacing of footings, differential settlement, uplift, ground improvement techniques, corrosion protection 6. Soil-structure interaction: modulus of sub-grade reaction, Winkler approach, beam on elastic foundations, raft superstructure interaction, laterally loaded piles 7. Reinforced concrete design: review of limit states method, analysis and design of isolated spread footings 8. Combined footings: rectangular, trapezoidal, beam-and-slab, cantilever, strap-beam and strip footings 9. Raft foundations: simplified and rigorous methods of analysis, structural design; flat slab rafts, beam-and-slab rafts, circular rafts, annular rafts, piled rafts 10. Pile foundations: structural analysis and design; precast piles, underreamed piles, pile caps 11. Retaining walls: cantilever walls, counterfort walls, basement walls, reinforced earth walls 12. Special topics: machine foundations, well foundations, soil anchors.

Text Books

- 1. Varghese, P.C., Design of Reinforced Concrete Foundations, Prentice-Hall of India Pvt. Limited, 2009. 2. Kurian, N. P., Design of Foundation Systems
- " Principles and Practices, Narosa Publishing House Pvt. Ltd., 2005.

Reference Books

- IS 456, IS 1080, IS 1904, IS 2911, IS 2950, IS 2974, Bureau of Indian Standards.
- 2. Pillai, S.U. and Menon D., Reinforced Concrete Design,
- McGraw-Hill Publishing Co. Ltd., 2011.
- 3. Bowles, J. E., Foundation Analysis and Design, Mc-Graw Hill International Editions, 2001.
- 4. Teng, W.C., Foundation
- Design, Prentice-Hall, Inc., 1962.
- 5. Srinivasulu, P. and Vaidyanathan C., Handbook of Machine Foundations, Tata-McGraw Hill, 2003.

Prerequisite: NIL