

**Pre – requisite:** 11 - CE 206, 11 – CE 302

**SYLLABUS:**

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**Foundation on collapsible and expansive soils:** Collapse potential and settlement, Computation of collapse settlement, Foundation design, Treatment methods for collapsible soils, Distribution of expansive soils, General characteristics of swelling soils, Clay mineralogy and mechanism of swelling, Definition of some parameters, Evaluation of the swelling potential of expansive soils by single Index Method, Classification of swelling soils by Indirect Measurement, Swelling pressure by direct measurement, Effect of initial moisture content and initial dry density on swelling pressure, Estimating the magnitude of swelling, Design of foundation in swelling soils, drilled pier foundations, Elimination of swelling

**Factors to consider in foundation design:** Footing Depth and spacing, Displaced soil effects, Net versus gross soil pressure design soil pressures, erosion problems for structures adjacent to flowing water, Corrosion protection, Water table fluctuation, Foundations in Sand deposits, Foundations on Loess and other collapsible soils, Foundations on sanitary landfill sites, Frost depth and foundations on permafrost, Environmental considerations problems.

**Spread footing design:** Footing Classification and purpose, Allowable soil pressures in spread footing design, Assumptions used in footing design, reinforced concrete design – USD, Structural design of spread footings, Bearing plates and anchor bolts, Pedestals, Rectangular footings, Eccentrically loaded spread footings, Unsymmetrical footings, Wall footings and footings for residential constructions, Design of spread footings with overturning moment problems.

**Spread footing and beams on elastic foundations:** Rectangular combined footings, design of trapezoid shaped footings, design of strap (or cantilever) footings, footings for industrial equipment, Modulus of sub grade reaction, Classical solution of Beam on Elastic foundation, Finite Element solution of beam on elastic foundation, General Comments on the finite element procedure problems.

**Mat foundations:** Types of Mat foundations, Bearing capacity of Mat foundations, Mat settlements, Modulus of subgrade reaction for mats, Design of Mat foundation, Finite difference Method for Mats, Finite element method for Mat foundations, The finite grid method, Mat superstructure interaction, Circular mats or plates.

**Machine foundations:** Design criteria for satisfactory action of a machine foundation, Theory of linear weightless spring, Methods of analysis of a block foundation, Soil spring constants, Determination of soil spring constants, Degrees of freedom of block foundation, vertical vibrations of a block foundations, Rocking vibrations of a block foundations, pure sliding of a block foundation, Indian Standard on design and construction of foundations for reciprocating machines.

**TEXT BOOKS**

1. Foundation analysis and design by J.E.Bowles, published by Mc Graw-Hill International Editions
2. Basic and applied soil mechanics by Gopal Ranjan and A.S.Rao, Wiley Eastern Limited

### **REFERENCE BOOKS**

1. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS publishers&istributors
2. Theory and Analysis of Foundations by N.N.Som &S.C.Das, Prentice Hall India Ltd.
3. Hand Book of Machine Foundations by CV Vaidyanathan and Srinivasulu P. Tata McGraw Hill Publishing Co. Ltd.