

(CE508) GROUND IMPROVEMENT TECHNIQUES

Objective of the Course:

At the end of course work the student is expected to learn various techniques of insitu ground modification. He is also expected to know other stabilization techniques depending upon the soil characteristics.

UNIT - I

Ground Improvement in Cohesion less Soil

Need for Ground Improvement, Different types of problematic soils, Emerging trends in ground Improvement. Shallow and deep compaction requirements, Principles and methods of soil compaction, Shallow compaction and methods. Properties of compacted soil and compaction control, Deep compaction and Vibratory methods Dynamic compaction.

UNIT - II

Ground Improvement in Cohesive Soil

Drainage and Dewatering-Drainage techniques - Well points - Vacuum and electro osmotic methods. Preloading with and without vertical drains. Compressibility, vertical and radial consolidation, preloading methods. Types of Drains, Design of vertical Drains, Construction techniques. Stone Column: Function Design principles, load carrying capacity, construction techniques, settlement of stone column foundation.

UNIT - III

Reinforced Earth

Principles, components of reinforced earth, governing design of reinforced earth walls, design principles of reinforced earth walls. Geotextiles-Introduction, types of Geotextiles, functions and their applications, tests for Geotextiles, Geogrids and their functions.

UNIT - IV

Mechanical Stabilization

Soil aggregate mixtures, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control. In situ soil treatment methods-Soil nailing, rock anchoring, micro-piles, construction techniques.

UNIT - V

Chemical Stabilization

Cement Stabilization-Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques. Lime and Bituminous Stabilization-Type of admixtures, mechanism, factors affecting, design of mixtures, construction methods-Grouting Techniques-Types of grouts - Grouting equipment and machinery - Injection methods – Grout monitoring – Stabilization with cement, lime and chemicals - Stabilization of expansive soils.

TEXT BOOKS:

1. Purushothama Raj. P, “Ground Improvement Techniques”, 2nd ed., Laxmi Publications (p) Ltd., New Delhi, 1998.
2. Craig, R.F., “Soil Mechanics”, 3rd ed., Van Nostrand Reinhold Co.,New York, 1993.
3. Koerner R.M., “Construction and Geotechnical Methods in Foundation Engineering”, 3rd ed., McGraw Hill, 1994.

REFERENCE BOOKS:

1. Moseley M.P., “Ground Improvement Blockie Academic and Professional”, 2nd ed., Chapman and Hall, Glasgow, 1993.
2. Jones J.E.P., “Earth Reinforcement and Soil Structure”, 3rd ed., Butterworths, 1995