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<b>B.Tech</b>	<b>IV Year</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>To</b>	<b>C</b>
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**CE439 GROUND IMPROVEMENT TECHNIQUES****(Dept. Elective - IV)****Course Description and Objective:**

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.

**Course Outcomes:**

- Identify ground conditions and suggest method of improvement
- Design and assess the degree of improvement
- understand the principles of soil reinforcement and confinement in engineering constructions
- Design reinforced soil structures

**UNIT – I**

**Ground Improvement in Cohesion less Soil:** Need for Ground Improvement, Objectives of Ground Improvement, Different types of problematic soils, and 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**

**Geosynthetics & Reinforced Earth:** Geosynthetics: Introduction, Types of

Geosynthetics, Functions and applications of different Geosynthetics.  
Geotextiles: Types of Geotextiles, tests for Geotextiles.

Reinforced Earth: Principles, components of reinforced earth, design principles of reinforced earth walls.

#### **UNIT - IV**

**Soil Stabilization:** Mechanical Stabilization: Soil aggregate mixtures, properties and proportioning techniques, soft aggregate 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.

#### **UNIT - V**

**Grouting:** Types of grouts - Grouting equipment and machinery - Injection methods – Grout Monitoring – Stabilization with Cement, Lime and Chemicals - Stabilization of Expansive Soils.

**Foundations in Expansive Soils:** Identification of expansive soil; Field conditions that favour swelling; consequences of swelling; Different alternative foundation practices in swelling soils; Construction practice of UR piles in swelling soils.

#### **TEXT BOOKS:**

1. Purushothama Raj. P, "Ground Improvement Techniques", 2<sup>nd</sup> ed., Laxmi Publications (p) Ltd., New Delhi, 1998.
2. Craig, R.F., "Soil Mechanics", 3<sup>rd</sup> ed., Van Nostrand Reinhold Co., New York, 1993.

#### **REFERENCE BOOKS:**

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