

GROUND IMPROVEMENT TECHNIQUES

Lectures / Tutorials : 4 Periods/Week

Sessional marks: 40

Semester End Exam. : 3 Hours

Semester End Exam. marks: 60

Credits : 4

Course Objectives:

- To introduce engineering properties of soft, weak and compressible deposits, principles of treatment for granular and cohesive soils and various stabilization techniques.
- To bring out concepts of reinforced earth.
- Applications of geotextiles in various civil engineering projects.

Course Outcomes

- Will gain competence in properly devising alternative solutions to difficult and earth construction problems and in evaluating their effectiveness before, during and after construction.
- A study of the many different approaches to the ground modification broadens the mind of any engineer and inspires creativity and innovation in Geotechnical construction and related fields..

UNIT-I

Introduction

Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique; objectives of improving soil.

In-situ densification methods in granular soils

Introduction, Vibration at the ground surface, impact at the ground surface, vibration at depth, impact at depth.

UNIT-II

In-situ densification methods in cohesive soils

Introduction, preloading, sand drains, sand wicks, band drains, stone and lime columns.

Reinforced earth

Principles, components of reinforced earth, governing design of reinforced earth walls, design principles of reinforced earth walls.

UNIT-III

Geotextiles

Introduction, types of geotextiles, functions and their applications, tests for geotextiles, geogrids and its functions.

Dewatering:

Dewatering – methods of dewatering and pressure relief, well point systems, deep well drainage, vacuum dewatering, electro osmosis, capacity of pumps and pumps design, installation and operation of dewatering systems – single line, two line, flow to a single well, multiple well systems.

Grouting:

Introduction; Kinds of grout- Cementitious grouts and Chemical grouts; Grouting methods- Intrusion grouting, Permeation grouting, compaction grouting and jet grouting.

UNIT-IV

Stabilization of soils:

Mechanical Stabilization -Soil aggregate mixtures, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control;

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.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

Engineering Principles of ground modification by MR Hausmann, McGraw-Hill , 1990.

REFERENCES

1. Ground improvement Techniques, P.Purushothama Raju, USP, 1999.
2. Designing with Geosynthetics by Robert M. Koerner, 5th Edition, Prentice Hall,2005.
3. Construction and Geotechnical methods in Foundation Engineering by R.M.Koerner, McGraw-Hill , 1984.
4. Current Practices in Geotechnical Engineering Vol.-I, Alam Singh and Joshi, International Book Traders, 1985.

WEB REFERENCES:

www.iitm.ac.in