

GROUND IMPROVEMENT TECHNIQUES

Course Learning Objectives:

The objective of this course is:

- To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils by adopting different techniques such as in situ densification and dewatering methods.
- To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
- To enable the students to know how geotextiles and geosynthetics can be used to improve the engineering performance of soils.
- To make the student learn the concepts, purpose and effects of grouting.

Course Outcomes:

- By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.
- The student should be in a position to design a reinforced earth embankment and check its stability.
- The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
- The student should be able to understand the concepts and applications of grouting.

SYLLABUS:

UNIT- I In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT –II Dewatering – sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis

UNIT- III Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT- IV Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.

UNIT- V Geosynthetics – geotextiles – types – functions , properties and applications – geogrids , geomembranes and gabions - properties and applications.

UNIT-VI Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests

Text Books:

1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.
2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.
3. An introduction to Soil Reinforcement and Geosynthetics, G. L. Siva Kumar Babu, Universities Press.

Reference:

1. Ground Improvement, M.P. Moseley, Blackie Academic and Professional, USA.
2. Designing with Geosynthetics, R. M Koerner, Prentice Hall