IV Year – I SEMESTER

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3+1*	0	3

Elective-I

CE705 (a) - GROUND IMPROVEMENT TECHNIQUES

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. 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.
2. To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
3. To enable the students to know how geotextiles and geosynthetics can be used to improve the engineering performance of soils.
4. To make the student learn the concepts, purpose and effects of grouting.

Course Outcomes:

a. 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.
b. The student should be in a position to design a reinforced earth embankment and check its stability.
c. The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
d. 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'by Purushotham Raj, Laxmi Publications, New Delhi.
2. 'Ground Improvement Techniques' by Nihar Ranjan Patro, Vikas Publishing House (P) Limited, New Delhi.
3. 'An introduction to Soil Reinforcement and Geosynthetics' by G.L.Siva Kumar Babu, Universities Press.

REFERENCE BOOKS:

1. 'Ground Improvement' by MP Moseley, Blackie Academic and Professional, USA.
2. 'Designing with Geosynethetics' by RM Koerner, Prentice Hall.

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