

GROUND IMPROVEMENT TECHNIQUES

VII Semester: CE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACE509	Elective	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
Contact Classes: 45		Tutorial Classes: Nil		Practical Classes: Nil			Total Classes: 45	
<p>COURSE OBJECTIVES: The students will try to learn</p> <ol style="list-style-type: none"> I. The importance and fundamentals of ground improvement techniques for for measuring field parameters by using traditional and modern methods involved in civil construction. II. The mechanical methods and suitable equipment to proliferate the ground for making the soil to withstand all the loads acting on it. III. The physical, chemical and hydraulic modification methods and its applications for strengthen the soil. IV. The applications of modern methods in civil construction alteration works, short creating, soil reinforcement, soil nailing, bolting involved in inclusion and confinement process <p>COURSE OUTCOMES: After successful completion of the course, students will be able to:</p> <p>CO 1 Identify the purpose of ground improvement techniques to obtain the suitable construction site for long-lasting structures.</p> <p>CO 2 List the problematic soils and its characteristics to select the suitable method for ground improvement.</p> <p>CO 3 Illustrate the various methods of ground improvement techniques to increase load bearing capacity of beneath and surface soils.</p> <p>CO 4 Apply the methods of physical, chemical, mechanical and hydraulic for obtaining void less soils.</p> <p>CO 5 Explain the various grouting techniques and its applications for improving loadbearing of beneath soils.</p> <p>CO 6 Outline the contribution of grouting materials and their influence on soils for greater load carrying capacity.</p> <p>CO 7 Recall the importance of admixtures and its composition for injecting the material into the soils.</p> <p>CO 8 Analyze the practical applications of reinforced soil and grid reinforced soils for better strength and durability of soils</p>								
UNIT-I	INTRODUCTION TO GROUND MODIFICATION						Classes: 09	
Need and objectives, identification of soil types, in situ and laboratory tests to characterize problematic Soils, mechanical, hydraulic, physical, chemical, electrical, thermal methods and their applications.								
UNIT-II	MECHANICAL MODIFICATION						Classes: 09	
Deep compaction techniques, blasting, vibro compaction, dynamic tamping and compaction piles.								

UNIT-III	HYDRAULIC MODIFICATION	Classes: 09
Objective and techniques, traditional dewatering methods and their choice, design of dewatering system, electro-osmosis, electro kinetic dewatering. Filtration, drainage and seepage control with geosynthetics, preloading the vertical drains.		
UNIT-IV	PHYSICAL AND CHEMICAL MODIFICATION	Classes: 09
Modification by admixtures, shotcreting and guniting technology, modification at depth by grouting, crack grouting and compaction grouting. Jet grouting, thermal modification, ground freezing.		
UNIT-V	MODIFICATION BY INCLUSIONS AND CONFINEMENT	Classes: 09
Soil reinforcement, reinforcement with strip, and grid reinforced soil. In-situ ground reinforcement, and ground anchors, rock bolting and soil nailing.		
Text Books:		
1. Hausmann, M.R “Engineering principles of Ground Modifications”, Tata McGraw-Hill publications, 1990.		
Reference Books:		
1. Koener, R.M, “Designing with Geosynthetics”, Prentice Hall, New Jersey, 1994. 2. Jones C.J.P, “Earth Reinforcement and soil structures”, Butterworths, London, 1985.		
Web References:		
1. http://nptel.ac.in/courses/105104034/ 2. http://www.myopencourses.com/subject/ground-improvement-techniques-1		
E-Text Books:		
1. http://www.sciencedirect.com/science/book/9780124080768		