

**Kadi Sarva Vishwavidyalaya, Gandhinagar**  
**M.E. (Civil Infrastructure Engineering) Semester: II**  
(w.e.f. Academic Year 2017-18)

**Subject Name: Soil Improvement Techniques.**

**Subject code: MECV206-N-B**

**A. Learning objectives:**

The objective of this course is

- To identify basic deficiencies of various soil.
- To decide various ways and means of improving the soil and implementing techniques of improvement.
- To be aware of various reinforced techniques to enhance Soil Bearing Capacity of poor soils.
- Applications of geo textiles in various civil engineering projects.

**B. Teaching Scheme (Credits and Hours)**

Teaching Scheme				Credit Scheme			Evaluation Scheme				
Lect (Hrs)	Tu (Hrs)	Prac. (Hrs)	Total (Hrs)	Theory	Pra/TW	Total	UE	IE	CIA	Prac/Viva	Total
04	02	00	06	04	01	05	70	30	20	30	150

**C. Detailed Syllabus**

Unit no.	Topics
1	<b>Introduction</b> Role of ground improvement in foundation engineering, Methods of ground improvement, Geotechnical problems in alluvial, laterite and black cotton soils, Selection of suitable ground improvement techniques based on soil condition.
2	<b>In situ Treatment Of Cohesionless And Cohesive Soils:</b> In situ densification of cohesion less and consolidation of cohesive soils, Dynamic compaction and consolidation ,Vibro flotation ,Sand pile compaction, Preloading with sand drains and fabric drains ,Stone columns, Lime piles, Installation techniques only ,Relative merits of various methods and their limitations.
3	<b>General Principles of Compaction:</b> Mechanics, field procedure, quality control in field.
4	<b>Earth Reinforcement:</b> Concept of reinforcement ,Types of reinforcement material, Applications of reinforced earth, Types of geo textiles, functions and their applications, tests for geo textiles, geo grids and its functions.
5	<b>Grout Techniques:</b> Grouting: Introduction; Kinds of grout- Cementations grouts and Chemical grouts; Grouting methods-Intrusion grouting, Permeation grouting, Compaction grouting and jet grouting.
6	<b>Expansive Soils:</b> Problems of expansive soil, Tests for identification, Methods of determination of swell pressure, Improvement of expansive soils, Foundation techniques in expansive soils.
7	<b>Stabilization of Soils:</b> <b>Mechanical Stabilization</b> -Soil aggregate mixtures, properties and proportioning techniques, soft

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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.

**D. Lesson Planning:**

Unit No.	Topics	Hours	Weightage (%)
1	Introduction	5	10
2	In situ Treatment of Cohesionless And Cohesive Soils	10	15
3	General Principles Of Compaction	6	8
4	Earth Reinforcement	9	14
5	Grout Techniques	10	15
6	Expansive Soils	8	13
7	Stabilization of Soils	12	25
<b>Total</b>		<b>60</b>	<b>100</b>

**E. Instructional Method and Pedagogy (Continuous Internal Assessment (CIA) Scheme)**

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 05 Marks Weightage.
- One internal exam will be conducted.
- Assignment/Surprise tests/Quizzes/Seminar will be conducted which carries 5 marks as a part of internal theory evaluation.
- The course includes a assignments, where students have an opportunity to build an Appreciation for the concepts being taught in lectures.

**F. Students Learning Outcomes:**

On successfully completion of term

- Students will learn planning and execution of soil exploration techniques.
- Student will able to work out field soil bearing capacity with appropriate methods & tools.
- Students will know the various I.S. code criteria for SPT test and results.

**G. Recommended Study Material:**

**Text Books:**

1. Koerner R.M., "Construction and Geotechnical Methods in Foundation Engineering", McGraw-Hill, 1994
2. Purushothama Raj, P. "Ground Improvement Techniques", Tata McGraw-Hill Publishing Company, New Delhi, 1995

**Reference Books:**

1. J.E.P., Earth Reinforcement and Soil Structure, Butterworths, 1995.
2. Koerner, R.M., "Design with Geo synthetics", (3rd Edition) Prentice Hall, New Jersey, 2002

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3. Jewell, R.A. "Soil Reinforcement with Geo textiles", CIRIA special publication, London, 1996
4. Das, B.M., "Principles of Foundation Engineering", Thomson Books / Cole, 2003.
5. I.S.9759: 1981 "Guidelines for Dewatering During Construction", Bureau of Indian Standards, New Delhi, Reaffirmed 1999
6. I.S.15284 (Part 1): 2003 "Design and Construction for Ground Improvement – Guidelines" (Stone Column), Bureau of Indian Standards, New Delhi, 2003

**Web Materials:**

1. <http://edudel.nic.in>
2. <http://bis.org.in/other/quake.htm>
3. [http://www.vastu-design.com/india\\_homes.htm](http://www.vastu-design.com/india_homes.htm)
4. <http://www.thepeninsulaneighborhood.com/ThePlan.html>
5. [http://www.historytution.com/indus\\_valley\\_civilization/town\\_planning.html](http://www.historytution.com/indus_valley_civilization/town_planning.html)