

Hall Ticket No

Question Paper Code: ACE509



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER

B. Tech VII Semester End Examinations, November - 2019

Regulations: R16

GROUND IMPROVEMENT TECHNIQUES

(CIVIL ENGINEERING)

Time: 3 hours

Max. Marks: 70

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. a) Differentiate between mechanical and hydraulic modification techniques? [7M]
b) What are the factors influencing the selection of ground improvement techniques? [7M]
2. a) Explain in detail various field compaction tests and its applicable soil types? [7M]
b) What are the objectives of various soil improvement methods? Give an outline of various available techniques. [7M]

UNIT – II

3. a) Write short notes on: [7M]
a) Heavy Tamping
b) Impact rollers
c) Plate vibrators.
b) What are compaction piles? Discuss the installation procedure of compaction piles. [7M]
4. a) How does a sand compaction pile improve the soil? Write a detailed note on its installation and functioning. [7M]
b) Differentiate between vibro compaction and vibro Replacement? Explain them in detail. [7M]

UNIT – III

5. a) What is preloading and when it is adopted as a ground improvement technique? [7M]
b) Explain in detail with the help of neat sketches, application of geosynthetics as separator? [7M]
6. a) Explain the design of dewatering system in hydraulic modification of the ground. [7M]
b) How do geosynthetics function as a filter? How does it differ in its function for drainage? [7M]
Explain in detail with sketches.

UNIT – IV

7. a) Explain stabilization by heating in thermal methods of ground improvement techniques also explain in brief Jet Grouting and compaction Grouting. [7M]
b) Discuss the application of Grouting, various methods of shotcreting, shotcrete vs gunitite in detail [7M]
8. a) Explain in detail difference between compaction and jet grouting? [7M]
b) Define [7M]
i) Shotcreting technology
ii) Guniting technology
iii) Thermal modification

UNIT – V

9. a) Explain in detail the use of geosynthetics as reinforcement? [7M]
b) With neat sketches explain in detail the various applications of reinforced earth for ground improvement? [7M]
10. a) What are the three basic material composites required in the construction of any reinforced soil structure? [7M]
b) What do you understand by reinforced earth? Enumerate various applications of reinforced earth. [7M]



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COURSE OBJECTIVES:

The course should enable the students to:

I	Identify the types of soils and categorize the problematic soils by in-situ laboratory tests.
II	Design dewatering systems to prevent significant groundwater seepage into the excavation and to ensure stability of excavation side slopes.
III	Modify the ground by different procedures such as admixtures, shot Crete, grouting and ground freezing.
IV	Apply different methods of soil reinforcement like soil anchors, rock bolts and soil nails in cohesive and granular soils.

COURSE OUTCOMES (COs):

CO 1	Describe different types of soils, In situ and laboratory tests to characterize soils.
CO 2	Describe various mechanical modification techniques like blasting, vibro compaction, dynamic tamping and compaction piles.
CO 3	Describe various dewatering methods, their choice and various hydraulic ground modification techniques.
CO 4	Explore the concept of soil modification by physical and chemical methods.
CO 5	Explain soil reinforcement technique, reinforcement with strip, in-situ ground reinforcement, ground anchors and soil nailing.

COURSE LEARNING OUTCOMES (CLOs):

ACE509.01	Understand the needs and objectives of ground improvement techniques.
ACE509.02	Identify soil types by performing In Situ and laboratory tests to characterize problematic soils.
ACE509.03	Analyze Mechanical, hydraulic, physico-chemical methods of ground improvement techniques.
ACE509.04	Understand Electrical, Thermal methods, and their applications of ground modification.
ACE509.05	Understand the need for mechanical modification
ACE509.06	Analyze Deep Compaction techniques
ACE509.07	Recognize the need for Blasting vibro compaction
ACE509.08	Understand the objectives and techniques of hydraulic modification.
ACE509.09	Identify traditional dewatering methods and their choice
ACE509.10	Design of dewatering system and understanding electro-osmosis technique
ACE509.11	Understand Electro kinetic dewatering technique and Filtration technique used in geosynthetics.
ACE509.12	Analyze drainage and seepage control with geosynthetics.
ACE509.13	Identify preloading the vertical drains and understand Physical and Chemical Modification of admixtures.
ACE509.14	Analyze the importance of Shotcreting and Guniting Technology.
ACE509.15	Understand modification at depth by grouting, Crack grouting and compaction grouting
ACE509.16	Understand Jet grouting technique, Thermal modification, Ground freezing.
ACE509.17	Understand modification by inclusions and confinement

ACE509.18	Recognize the need for Soil reinforcement and grid reinforced soil.
ACE509.19	Analyze the importance of In-situ ground reinforcement.
ACE509.20	Understand ground anchors, Rock bolting and soil nailing.

MAPPING OF SEMESTER END EXAMINATION - COURSE OUTCOMES

SEE Question No		Course Learning Outcomes	Course Outcomes	Blooms Taxonomy Level	
1	a	ACE509.03	Analyze Mechanical, hydraulic, physic-chemical methods of ground improvement techniques.	CO 1	Understand
	b	ACE509.01	Understand the needs and objectives of ground improvement techniques.	CO 1	Understand
2	a	ACE509.02	Identify soil types by performing In Situ and laboratory tests to characterize problematic soils.	CO 1	Understand
	b	ACE509.04	Understand Electrical, Thermal methods, and their applications of ground modification	CO 1	Understand
3	a	ACE509.07	Analyze Deep Compaction techniques	CO 2	Remember
	b	ACE509.06	Analyze Deep Compaction techniques	CO 2	Understand
4	a	ACE509.08	Understand the objectives and techniques of hydraulic modification.	CO 2	Understand
	b	ACE509.05	Understand the need for mechanical modification	CO 2	Understand
5	a	ACE509.11	Understand Electro kinetic dewatering technique and Filtration technique used in geosynthetics.	CO 3	Understand
	b	ACE509.12	Analyze drainage and seepage control with geosynthetics.	CO 3	Remember
6	a	ACE509.09	Identify traditional dewatering methods and their choice	CO 3	Remember
	b	ACE509.11	Understand Electro kinetic dewatering technique and Filtration technique used in geosynthetics.	CO 3	Understand
7	a	ACE509.14	Analyze the importance of Shotcreting and Guniting Technology.	CO 4	Understand
	b	ACE509.13	Identify preloading the vertical drains and understand Physical and Chemical Modification of mixtures.	CO 4	Understand
8	a	ACE509.15	Understand modification at depth by grouting, Crack grouting and compaction grouting	CO 4	Understand
	b	ACE509.16	Understand Jet grouting technique, Thermal modification, Ground freezing.	CO 4	Remember
9	a	ACE509.20	Understand ground anchors, Rock bolting and soil nailing.	CO 5	Understand
	b	ACE509.17	Understand modification by inclusions and confinement	CO 5	Understand
10	a	ACE509.18	Recognize the need for Soil reinforcement and grid reinforced soil.	CO 5	Understand
	b	ACE509.19	Analyze the importance of In-situ ground reinforcement.	CO 5	Understand

Signature of Course Coordinator

HOD, CE