

IV B.TECH - I SEMESTER EXAMINATIONS - MAY, 2011
GROUND IMPROVEMENT TECHNIQUES
(CIVIL ENGINEERING)

Time: 3hours

Max. Marks: 80

Answer any FIVE questions
All Questions Carry Equal Marks

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1. a) What is dewatering? Explain its importance in civil engineering works.
 b) Explain in detail with neat sketch the electro-kinetic approach of dewatering. [8+8]
2. Considering the groutability of various types of soils, what method do you recommend grouting fine grained soils? Discuss in detail with neat sketches. [16]
3. What are the various vertical drains? Discuss the principle of sand drain method and explain the procedure with suitable sketches how the soils are densified by sand drains method. In what respects the method of sand wicks differ from sand drains. [16]
4. a) Discuss the practical situations which necessitate the ground modification and write the objectives of ground modification.
 b) What are the quality control tests in shallow compaction? Explain the Proctor needle method. [8+8]
5. What are the various admixtures used in stabilization of soil? Describe in detail the engineering benefits of lime modification of soils. [16]
6. a) What do you understand about the Gabions and explain the applications of Gabions in civil engineering.
 b) What do you understand by reinforced earth? Explain the mechanism of its action in resisting the active earth pressure. [8+8]
7. Explain the following:
 a) Physical properties of Geo-textiles.
 b) Burst strength of geo-textile.
 c) Durability of geo-textile.
 d) Seam strength of geo-textile. [16]
8. a) Explain the causes of swelling and shrinkage of soils and discuss the effects of expansive soils on civil engineering structures.
 b) Write the desirable properties of cohesive non swelling (CNS) soils. [8+8]

CODE NO: 07A70109

R07

SET - 2

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1. a) Explain the purpose of 'preloading' and 'vertical drains' with neat sketches.
b) How do you accelerate the consolidation in soft clay of thickness more than 10m? Explain. [8+8]
2. a) Explain any three engineering application of grouting which proves to be effective?
b) Write a note on suspension and solution grouting techniques and their effectiveness in improving the in-situ soil conditions. [8+8]
3. a) Discuss the soil properties and their limits which govern the ground improvement in granular soils.
b) Explain in detail, how the heavy tamping technique can be used to improve the ground. In what type of soil and ground conditions you recommend this technique. [8+8]
4. a) Write the limits of soil parameters which suggest whether ground improvement required or not.
b) Discuss how field quality control is checked for deep treated clay soils. [8+8]
5. Discuss about soil-lime reactions. Explain the Engineering benefits of lime stabilization. Write short note on types of soil bitumen. [16]
6. Explain the components of reinforced earth. Write the design approach of reinforced earth wall. [16]
7. a) What is the main difference between Geo-grid and geo-textile? Explain the field applications of geo-grid and geo-textiles.
b) Explain with suitable examples the principles involved in geo-textile material as reinforcement for improving the bearing capacity of soil. [8+8]
8. What are the different design considerations of foundations on expansive soils? Discuss the under reamed pile construction and its ultimate load carrying capacity aspects. [16]

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R07

SET - 3

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1. What is dewatering? Explain the various aspects to be considered in design of dewatering systems. [16]
2. a) What do you understand soil stabilization by grouting? Explain in detail various field of applications of grouting.
b) Describe in detail the grouting with 'soil-cement mixes', 'cement', and 'lime' grouts. [8+8]
3. Discuss the need of ground improvement and write the principles of ground improvement in cohesive and cohesion less soils. [16]
4. What are the characteristics of problematic soils? Explain the construction methods of the following techniques:
i) Lime Columns and ii) Rammed Stone Columns. [16]
5. Write a note on the following:
a) Soil – Cement stabilization.
b) Soil – Bitumen stabilization.
c) Soil – Flyash stabilisation.
d) Mechanical stabilisation. [16]
6. Explain the basic principles in the design of reinforced earth wall. Write the applications and advantages of reinforced earth with neat sketches. [16]
7. a) What are geotextiles? Write a note on common nomenclature of geosynthetics.
b) List the various applications and functions of geotextiles in civil engineering works. [8+8]
8. What is swelling pressure? Explain how swelling pressure is estimated using constant volume method and from consolidation test. [16]

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1. a) Explain in detail about the dewatering techniques used in cohesive soils.
b) Write the salient points in the selection criteria of fill material around drains. [8+8]
2. a) What is grouting? Explain in detail various field of applications of grouting.
b) Explain compaction grouting, penetration grouting and fracture grouting with neat sketches. [8+8]
3. a) What are the various ground improvement techniques for densifying the loose granular soils existing for deeper depths?
b) Explain with neat sketches mechanism and principle of Dynamic Compaction Techniques. [8+8]
4. At a site, it is proposed to construct a breakwater for protecting the newly proposed harbor facility. The soil investigation carried out at this site show that there exist almost uniform strata for the entire proposed breakwater construction area. For the soil data presented below, state whether ground treatment is required or not. If so required explain any one of the suitable ground improvement techniques with neat sketches. [16]

Depth (m)	0 to 10	10 – 20	20 – 35	35 – 50
Natural Water Content (%)	45	35	35	10
Liquid Limit (%)	50	50	60	28
Plastic Limit (%)	25	25	30	12

5. a) What are the Engineering benefits of lime stabilization? Discuss the various chemical reaction involved in lime stabilisation.
b) What understand about the bituminous stabilization? Explain how the engineering properties of soil are modified by bituminous stabilization. [8+8]
6. a) What is soil reinforcement? List various materials to be used in soil reinforcement.
b) Write the applications and advantages of reinforced earth with neat sketches. [8+8]
7. a) What is the main difference between geo-grid and geo-textile? Explain the field applications of geo-grid and geo-textiles.
b) Explain with the neat sketches the philosophy involved in the geo-textiles material as reinforcement for improving the bearing capacity of soil. [8+8]
8. a) What are the expansive soils? Discuss the field conditions that favor the swelling and write its consequences.
b) List various identification methods of expansive soils. Explain the principles involved in DTA, XRD and Electron Microscopy methods for identifying expansive soils. [8+8]
