

Code.No: 07A70109

R07

SET-1

IV B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
GROUND IMPROVEMENT TECHNIQUES
(CIVIL ENGINEERING)

Time: 3hours**Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

- - -

1. a) Define dewatering and list the various dewatering techniques with neat sketches.
b) Discuss in detail with suitable examples the field conditions which necessitate dewatering in soil. [8+8]
2. a) What do you understand about soil stabilization by grouting? Explain in detail various field of applications of grouting.
b) Describe the equipment used in the grouting technique. [8+8]
3. What other design or construction alternatives would be considered besides soil improvement such as compaction in order to overcome difficult foundation problems? Explain in detail. [16]
4. a) What are the reclaimed soils? Explain the problems posed by the reclaimed soils?
b) Discuss in detail with neat sketches any one of the treatment techniques for improvement of reclaimed soils containing soft clay for deeper depths. [6+10]
5. Differentiate stabilization and densification of soils. Discuss the principles and typical gradation specifications of mechanically stabilized bases and surfacing. [16]
6. What do you understand about reinforced earth wall? Discuss with neat sketches the components of reinforced earth wall and list the various advantages of reinforced earth structures. [16]
7. a) What are geo textiles? Write a note on common nomenclature of geo synthetics.
b) List the various applications and functions of geo textiles in civil engineering works. [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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Answer any FIVE questions
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- - -

1. a) Explain with neat sketches dewatering using sumps and interceptor ditches.
 b) With neat sketches compare and discuss how the dewatering is done using single and multistage well point systems. [8+8]
2. Explain in detail grouting by hydraulic fracturing in soils and rocks. Discuss post grout quality control tests. [16]
3. a) What are the various field compaction equipments? Discuss their suitability for different soils.
 b) Discuss in detail various factors affecting the compaction. [8+8]
4. At a proposed railway embankment site, a standard penetration test was carried out up to a depth of 35m from the existing ground level. The SPT 'N' values reported with the depth are presented in table below.

| Depth (m) | 0 to 10 | 10 to 17 | 17 to 30 | 30 -35 |
|-------------------------|---------|----------|------------|--------------|
| Corrected SPT 'N' Value | 2 - 4 | 10 - 13 | 14 - 18 | 36 - 50 |
| Soil Type | Clay | Clay | Sandy clay | Sandy gravel |

Based on the above soil data, suggest whether soil improvement is required or not for constructing the proposed embankment. If so required, explain any one of the suitable ground improvement techniques with neat sketches. [16]

5. a) What are the various soil stabilization techniques? Write their suitability with respect to the soil type.
 b) Discuss the gradation limits for soil – cement stabilization and explain its construction procedure. [8+8]
6. Discuss the concept of reinforced earth and write the advantages and applications of reinforced earth structures with neat sketches. [16]
7. Discuss the necessary requirements and relevant properties of geo textiles when used for different hydraulic & mechanical functions. [16]
8. a) Explain the field conditions that favor the swelling and write its consequences.
 b) Discuss the specifications of a soil as cohesive non swelling (CNS) material. [8+8]

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Time: 3hours**Max.Marks:80**

Answer any FIVE questions
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- - -

1. a) List various well point dewatering systems and explain their suitability for different soils.
 b) With neat sketches explain the working principle of vacuum well point system of dewatering. [8+8]
2. a) Explain any three engineering application of grouting which proves to be effective?
 b) Describe in detail the grouting with 'soil-cement mixes', 'cement', and 'lime' grouts. [8+8]
3. Discuss the effectiveness of both vibroflotation and compaction piles for compacting the granular soils. In what respects the compaction piles differ from vibroflotation. [16]
4. Explain working principles and soil improvement mechanism using 'Rammed Stone Column' and 'Vibro-Replacement' methods. Also highlight the typical characteristics and the relative effectiveness of both the methods. [16]
5. a) Discuss the chemical reactions that take place in lime treated soils and write the benefits of lime stabilization in soil.
 b) What is bituminous stabilization? Discuss the necessary requirements to achieve best results in soil-bitumen stabilization. [8+8]
6. What is reinforced earth structure? Explain the various design formulae in reinforced earth wall. [16]
7. a) Write the various applications and functions of geo textiles in civil engineering works.
 b) Discuss how geo textiles are useful in earth dam construction. [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]

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Answer any FIVE questions
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- - -

1. Write short notes on the following with reference to dewatering:
 - i) Horizontal wells,
 - ii) Foundation drains and
 - iii) Blanket drains. [16]

2. a) Describe different grouting techniques depending upon the stabilizer used.
 b) Write a note on suspension and solution grouting techniques and their effectiveness in improving the in-situ soil conditions. [8+8]

3. It is proposed to construct large oil tanks for storage purpose near port area at Kakinada in Andhra Pradesh. Due to shortage of land, the required extent of water area is completely filled up with the reclaimed soil and made as an artificial ground for construction. Based on the soil investigation carried out on the reclaimed soil, it is observed that the top 20m soil is saturated loose sand (SPT “N” = 2 to 6) and below this up to a depth of 25 m there is a soft to medium stiff clay (SPT “N” = 4 to 8). From 25 to 40 m depth the soil is medium dense to dense clayey sand (SPT “N” = 25 to 40). For this soil condition, suggest whether soil improvement is required or not for constructing the proposed oil storage tanks. If so required, explain any one of the suitable ground improvement techniques with neat sketches. [16]

4. a) With neat sketches explain in-situ densification methods in cohesive soils.
 b) Discuss how the stress history of a soil deposit affects its suitability for preloading with vertical drains? [8+8]

5. a) Discuss the in-situ soil conditions which necessitate soil stabilization and list various methods of soil stabilization with their suitability with respect to the soil type.
 b) What is chemical stabilization? Discuss how calcium chloride and sodium chloride modify the soil characteristics. [8+8]

6. Stating the assumptions, explain design steps of reinforced earth wall with clear illustrations. [16]

7. What are geo textiles? Explain with neat sketches use of geo textiles in earth dam and road construction works. [16]

8. What is swelling pressure? Explain how swelling pressure is estimated using constant volume method and from consolidation test. [16]
