

IV B.Tech I Semester Regular Examinations, November 2005
GROUND IMPROVEMENT TECHNIQUES
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the terms Vibro-Compaction and Vibro-Replacement, highlighting the typical characteristics and the relative effectiveness of both the terms. [16]
2. Write short notes on the following: [8+8]
 - (a) Stone and lime columns.
 - (b) Thermal methods.
3. (a) Explain in detail soil stabilisation by grouting? [8+8]
 (b) Describe the equipment used in grouting technique.
4. (a) Explain the basic mechanism of reinforced Earth. [8+8]
 (b) How is soil selected in reinforced earth application? What are the popular reinforcing materials? Explain briefly.
5. What are the different tests conducted on Geotextile materials and what properties are evaluated from these tests. Explain any one test procedure. [16]
6. (a) Based on the swelling pressure of different clays, how do you judge the expansive nature of these clay soils. [8+8]
 (b) Describe the procedures for determining the swelling pressure of clays as per I.S procedure.
7. Find the proportions of the materials A, B, and C by the Rothfuchs method so that the mixtures may approximate to the desired grading using the data given below. [16]

I.S.Sieve	% Passing			
	Desired Grading	Materials A	Materials B	Materials C
40mm	100	95	—	—
20mm	85-100	70	—	—
10mm	65-100	21	—	—
4.75mm	55-85	11	100	—
2.36mm	40-70	7	85	—
425micron	25-45	2	55	—
75micron	10-25	Trace	Nill	100

8. What is soil stabilization? And what are the different methods of soil stabilization? Explain. [16]

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1. Explain the terms Vibro-Compaction and Vibro-Replacement, highlighting the typical characteristics and the relative effectiveness of both the terms. [16]
2. What other design or construction alternatives would be considered besides soil improvement such as compaction in order to overcome a difficult foundation problem? Explain in detail. [16]
3. (a) Explain any two grouting techniques. [8+8]
(b) Explain any three engineering application of grouting which proves to be effective?
4. (a) Design a reinforced earth wall for retaining a 6metre high cohesionless soil. The soil in the wall and backfill has density of $18\text{KN}/m^3$ with angle of internal friction of 35 degrees. The allowable soil pressure is $150\text{KN}/m^2$. Use galvanized strips as reinforcement? [12+4]
(b) Explain the principle involved in the reinforced earth.
5. What are the different tests conducted on Geotextile materials and what properties are evaluated from these tests. Explain any one test procedure. [16]
6. (a) Discuss the field conditions that generally favour swelling in expansive soil. [8+8]
(b) Define the terms, 'Free Swell', 'Differential Free Swell', 'Swelling Pressure' and 'Field moisture content'
7. What is meant by dynamic compaction? Explain in detail the procedure of conducting laboratory test of compaction. [16]
8. What do you understand by soil stabilization? What engineering properties of Soils are generally to be modified through the process of stabilization. [16]

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1. (a) List the objectives of compacting soil and explain the purpose compaction. [8+8]
 (b) What are the strategies developed for optimizing the densification process?
2. (a) Explain in detail about the dewatering techniques used in cohesive soils. [8+8]
 (b) What is meant by Smear? Explain in detail the effect of Smear.
3. (a) What is grouting? Explain in detail the methods of grouting? [8+8]
 (b) Explain in detail various field of applications of grouting.
4. (a) Explain the basic mechanism of reinforced Earth. [8+8]
 (b) How is soil selected in reinforced earth application? What are the popular reinforcing materials? Explain briefly.
5. (a) What are Geotextiles? List out the important physical and mechanical properties of Geotextiles. [8+8]
 (b) State the various applications of Geotextiles that can be used in place of filter soils. Suggest a procedure of using Geotextiles to prevent cracks in existing Asphalt pavements.
6. (a) How do you compute the load carrying capacity of an under reamed pile in clay soil. [8+8]
 (b) Give some commonly adopted dimensions for an under reamed pile with two bulbs and draw sketches indicating the dimensions.
7. Find the proportions of the materials A, B, and C by the Rothfuchs method so that the mixtures may approximate to the desired grading using the data given below. [16]

I.S.Sieve	% Passing			
	Desired Grading	Materials A	Materials B	Materials C
40mm	100	95	—	—
20mm	85-100	70	—	—
10mm	65-100	21	—	—
4.75mm	55-85	11	100	—
2.36mm	40-70	7	85	—
425micron	25-45	2	55	—
75micron	10-25	Trace	Nil	100

8. (a) Write a detailed note on the various types of admixtures to be used to make lime and bitumen stabilization effective in case of different types of soils.[8+8]
- (b) What are the various forms in which bitumen can be added to soil for effective stabilization?

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3. (a) What is grouting? Explain in detail the methods of grouting? [8+8]
(b) Explain in detail various field of applications of grouting.
4. (a) Explain the basic mechanism of reinforced Earth. [8+8]
(b) How is soil selected in reinforced earth application? What are the popular reinforcing materials? Explain briefly.
5. (a) List the major functions that the Geotextiles are intended to perform. [8+8]
(b) Explain how Geotextiles can be used as separators.
6. (a) Discuss the consequences of swelling on structures. [8+8]
(b) Discuss and state how these two parameters.
 - i. swelling potential and
 - ii. plasticity index are related.
7. (a) Discuss in detail, Ruthfutchs method of proportioning of materials. [8+8]
(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. Describe the different steps involved in the process of soil stabilization. Explain Lime-Soil reactions. [16]
