Roll No.									

B.E./B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2012

CIVIL ENGINEERING BRANCH

SEVENTH SEMESTER

CE 9403 - GROUND IMPROVEMENT TECHNIQUES

(REGULATIONS 2008)

Time : 3 hr Max Mark: 100

Instructions: 1. Assume relevant data if required

Answer ALL Questions

Part - A (10 × 2 = 20 Marks)

1. What are the importances of Ground Improvement?
2. What is the role of grain size distribution on the selection of suitable ground improvement technique?
3. State important limitations of well point system dewatering.
4. Write the two dimensional equation governing the flow of fluid through porous media.
5. Why, under low pressure range, the compressibility of soil compacted at dry of OMC is lesser than the soil compacted at wet of OMC for same initial void ratio?
6. Differentiate the functions of stone column and lime pile.
7. Differentiate the role of geosynthetics as filtration from drainage
8. List various factors affecting the durability of geotextile?
9. State any two advantages of true solution grout over suspension grout.
10. What are the limitations of lime stabilization?

Part - B (5 × 16 = 80 Marks)

11. a(i) Discuss in detail various ground improvement techniques and its suitability based on soil condition. (8)

    a(ii) Discuss in detail the geotechnical problems associated with black cotton soils. Suggest also the appropriate ground improvement technique to overcome the problems associated with the same. (8)

12. a(i) Discuss in detail vacuum dewatering systems in practice and bring out its merits and demerits. (8)

    a(ii) Discuss the suitability of various dewatering system based on soil type. (8)

    or

    b(i) Derive the relationship between the head and rate of discharge for flow to a fully penetrating slot in a homogeneous confined aquifer from a single line source. State clearly the assumptions made. (8)

    b(ii) Wells are located at the corner of a square of width 8m. The aquifer is 12m thick. The water level in the center has to be lowered by 4m. Determine the pump rate required. The coefficient of permeability is 0.033m/s, and the well radius is 0.3m. Assume h_0=7.6m for the estimate of influence range. (8)

13. a. A soft clay having $c_v=0.5c_h$ ($c_h=5\times10^{-3}$ cm^2/sec) is 8m thick lies at a depth of 3m from the ground level. The top 3m soil is sand. The soil below clay is also sand and is as permeable as the top sand layer. It is proposed to consolidate the clay layer by preloading technique under a surcharge pressure of 80kN/m^2. Calculate the time required for 90% consolidation. If it is proposed to accelerate the consolidation by providing sand drains of 30cm diameter at a spacing of 3m in a triangular pattern, arrive time required for 90% consolidation due to radial drainage alone. (16)

or

b(i) Explain with neat sketch various steps in each compaction sequence of "Vibroflotation" technique for densifying cohesionless soils. (10)

b(ii) How the compaction alters the fabric of clayey soil. Bring out its influence on the strength under different drainage conditions. (6)

14. a(i) Explain step by step procedure for the construction of a pavement using geotextile. (8)

a(ii) Discuss the requirements of reinforcing material. (8)

or

b. A retaining wall with geotextile reinforcement is 5m high. For the granular backfill, γ=16kN/m^3 and ϕ'=32°. For the geotextile, σ_G=20kN/m. Design the wall with above properties of geotextile for the factor of safety of 1.5 against both tearing and pullout failures. (16)

15. a(i) What are the factors controlling the performance of grout? How will you quantify these factors? (8)

a(ii) Explain the method of TAM grouting with neat sketch. (8)

or

b(i) Explain in detail the mechanism of lime stabilisation. (8)

b(ii) Why dispersants are used very limited way in stabilization of soil? State the different ways by which dispersants react with soils. (8)

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