Roll No.										

B.E./B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2011

CIVIL ENGINEERING BRANCH

(5)

SIXTH SEMESTER

CE532 - GROUND IMPROVEMENT TECHNIQUES

(REGULATIONS 2004)

Time : 3 hr Max Mark: 100

Answer ALL Questions

Part - A (10 × 2 = 20 Mark)

1. What are the geotechnical problems associated with alluvial soil?
2. What are the factors affecting selection of suitable ground improvement technique?
3. What is the difference between electro-osmatic flow and gravity flow in porous medium?
4. What are the causes of lowering the ground water table?
5. Determine the equivalent diameter for the band drain of size 100mm×4mm.
6. What is the compaction energy required to compact a cohesionless deposit to a depth of 6m by dynamic compaction.
7. What is mean by strain compatibility?
8. What factors would affect the durability of geotextile filter or drainage layers embedded in soils?
9. List the physical characteristics of a grouting liquid relevant to engineering applications.
10. What is the difference between permeation grouting and compaction grouting?

Part -B (5 × 16 = 80 Mark)

11. (i) Discuss briefly various ground improvement techniques available and their suitability. (8)

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

12. a(i) Explain the arrangement and operation of vacuum dewatering. (8)

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

    or

    b(i) Explain the principle of electroosmotic method of dewatering. (8)

    b(ii) A slot which is parallel to the source is at a distance of 300m from the source and the piezometric surface corresponds to no flow condition is 1.5m from the ground level, which corresponds to the level of water at the source. The deposit in this area is impervious to a

depth of 6m, which is underlained by a confined aquifer of 6m thick. The deposit below the confined aquifer is also impervious. It is proposed to reduce the head at the slot by 4m from the initial piezometric level. What is the discharge expected if the coefficient of permeability of aquifer is 2×10^{-4}m/s? (8)

13. a(i) Discuss various field compaction equipments available based on their suitability. (8)

a(ii) Bring out the effects of compaction on various properties of fine grained soil. (8)

or

b(i) Compare the mechanisms and merits between the beds stabilized with stone columns and lime piles. (8)

b(ii) It is proposed to stabilize soft clay bed of 6m thick by sand drains arranged at an effective radius of 2.5m. The radius and other details of drain are as follows: r_w=0.2m, r_s=0.3m, c_v=c_{vr}=0.25m^2/month, k_h=2k_v. Determine the degree of consolidation after one year of application of surcharge. (8)

14. a(i) Explain the concept of earth reinforcement. (8)

a(ii) Bring out various types of reinforcement materials used for soil reinforcement highlighting their merits and demerits. (8)

or

b(i) Bring out the mechanisms by which the geotextile performs the function of filtration. (8)

b(ii) Explain the application of geosynthetics in road works. (8)

15. a(i) Explain in detail different types of grouts. (8)

a(ii) Explain the procedure to monitor the flow of grout. Elucidate the grout performance with suitable flow rate – time curves for different methods of grouting. (8)

or

b(i) Explain the basic chemical reactions that may occur when lime and cement are added to the fine grained soil. (8)

b(ii) List various organic chemicals used for soil stabilisation? Indicate their efficiency in stabilisation of expansive soil compared to lime. (8)

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