D 21787 (Pages : 2) Name.....

Reg. No.....

EIGHTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2011

CE 04 804 (C) – GROUND IMPROVEMENT TECHNIQUES

(2004 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

1. (a) A highway alignment passes through a region where the sub-soil is highly compressible clay. Describe any *one* technique by which the consolidation of this clay can be hastened so that the construction of the road can be completed early.

   (b) What is preloading? Explain the suitability of preloading techniques with illustration.

   (c) What are the favourable properties of fly ash used in the soil stabilization?

   (d) Explain the jet grouting process.

   (e) Explain the material composites required in the construction of reinforced soil structure.

   (f) Explain earth nailing.

   (g) A zone of buried trash has been found at a proposed construction site. The total volume of this trash appears to be 100 m^3 and all of its appears to be within 3 m of the ground surface. This trash is weak and compressible, and thus would not provide adequate support for the proposed construction. The remainder of the site is underlain by ML and SM soils and the groundwater table is at a depth of 15 m. Recommend a method of solving this problem and explain the method with suitable geotechnical justifications.

   (h) Write a short note on geo-grids.

(8 × 5 = 40 marks)

2. (a) Explain the dynamic compaction process for granular soils and compare with surface compaction technique.

Or

   (b) A sandy soil has a maximum dry density of 16 kN/m^3 and a dry density of compaction in the field of 15 kN/m^3. Estimate

      (i) The relative compaction in the field.

      (ii) The relative density in the field.

      (iii) The maximum dry density of the soil.

Turn over

3. (a) Explain the suitability of lime stabilization in cohesive soils. How do you estimate the bearing capacity and settlement of lime treated soils.

Or

(b) Explain systems, operations and applications of chemical grouting in detail.

4. (a) Discuss about the load transfer mechanism and strength development of reinforced soil structure.

Or

(b) An 8 m high retaining wall with galvanized steel strip in a granular backfill has to be constructed. For the granular backfill $\gamma_1 = 16.6$ kN/m^3 and $\varphi_1 = 30°$. For galvanized steel reinforcement, width of the strip. $w = 75$ mm, $S_v = 0.5$ m center to center. $S_H = 1$ m center to center, $f_y = 2.4 \times 10^5$ kN/m^2, $\varphi_u = 20°$, required $FS_{(B)} = 3$ and required $FS_{(P)} = 3$, For in-situ soil, $\gamma_2 = 18$ kN/m^3 and $\varphi_2 = 28°$ and $c_2 = 70$ kN/m^2. Check for the external and internal stability of the wall. Assume the corrosion rate of the galvanized steel to be 0.025 mm/year and the life span of the structure to be 50 years.

5. (a) A geotextile reinforced retaining wall 5 m high. For the granular backfill $\gamma_1 = 19$ kN/m^3 and $\varphi_1 = 36°$. For the geotextile $\sigma_a = 80$ lb/in. For the design of the all, determine S_v, L and l_1.

Or

(b) What are the functions of geo-synthetic? Explain the functions with neat sketches.

(4 × 15 = 60 marks)