Ex/BESUS/CE-603/07

B.E. (CE) Part-III 6th Semester Examination, 2007

Soil Mechanics-II (CE-603)

Time : 3 hours **Full Marks : 100**

Use separate answerscript for each half.

FIRST HALF

(Answer Q.No.1 and TWO from the rest.)

1. Write short notes on any FOUR from the following: 4@5 = 20
   (a) Causes of failure of slopes
   (b) Remedial measures for stabilizing slopes
   (c) Infinite and finite slopes
   (d) Field compaction machineries
   (e) Objectives of compaction
   (f) Mechanical Properties of geotextiles

2. (a) Derive the expression for determining the critical height of an infinite slope of clay deposit.
   (b) An embankment 6.5 m high has a slope of 1V: 2H. The material of slope has $\varphi = 30°$, $c = 5$ kN/m^2 and $\gamma = 19$ kN/m^3. A trial slip circle has a radius of 10.0 m and its centre is at the same level as the top of the embankment. The slip circle passes through the toe. By the method of slices, find the factor of safety of the slope with respect to this slip circle. 15

3. (a) What are the methods adopted for measuring the density of the compacted soil in the field? Briefly describe any one of the methods.
   (b) Proctor's compaction test was carried out on a soil sample, and the following observations were made. The volume of the mould is 940×10^{-6} m^3 and the specific gravity of the soil solids is 2.65.

Wt. of wet sample (N)	17.00	18.90	20.30	19.90	19.60	21.20
Water content (%)	7.7	11.5	14.6	17.5	19.5	21.2

   Plot the compaction curve, and determine (i) the maximum dry density, (ii) optimum moisture content and (iii) Draw 100% saturation line. 15

4. (a) Enumerate the types of failure of slopes.

(b) Enumerate the functions of geotextiles

(c) Explain the method proposed by Fellenius to find out the centres of trial circles for stability analysis. 15

5 (a) Enumerate the admixtures generally used for soil stabilization.

(b) Draw typical compaction curve for the following types of soil:

(a) sand, (b) montmorillonite , and (c) gravel.

(c) A field density test was conducted by core cutter method. The observation data is given below:

i. weight of empty core cutter = 23.0 N
ii. weight of soil + core cutter = 49.5 N
iii. internal dimension of the core cutter: 910 mm dia. × 178 mm height
iv. weight of sample for moisture content determination = 0.54 N
v. weight of oven dry sample = 0.50 N
vi. specific gravity of soil grains = 2.68

Determine dry density, and degree of saturation. 15

SECOND HALF

(Answer Q.No.6 and TWO from the rest.)

6. Write short notes on any FOUR of the following 4@5=20

(a) Depth and spacing of bore holes
(b) States of earth pressure
(c) Advantages of steel sheet piles
(d) Stabilization of bore holes
(e) Wash boring
(f) Rankine earth pressure theory

7. (a) Briefly describe the standard presentation test.

(b) Discuss the corrections to be applied to the measured SPT values.

(c) The observed SPT value in a deposit of fully submerged silty sand is 34 at a depth of 6.5 m from ground surface. The average saturated unit weight of the soil is 18.8 kN/m^3 . Determine the corrected SPT value and comment on the type of soil. 15

8. (a) Enumerate the activities involved in soil exploration programme.

(b) What is a 'bore log'? Sketch a typical 'bore log'.

(c) List the salient features of a soil exploration report. 15

9. (a) Describe the steps in checking the stability of a retaining wall.

(b) Determine by Culmann's graphical method the active earth pressure per metre run of a retaining wall of height 7 m ,given that the backfill γ_d=16 kN/m^3, Φ=35° and the angle of wall friction δ=20°. The back of the wall is inclined at 20° to the vertical and the backfill surface slope is 1V: 10H. 15

10. (a) What are the difference types of cofferdams?

(b) Derive the expression for embedment depth of a cantilevers sheet piling wall having granular soil above and cohesive soil below the dredge level.

(c) Compute the depth of embedment and tension in the anchor rod for an anchored bulkhead of height 6.2m to retain a backfill having the following properties:

γ=18.5 kN/m^3 , γ_{sat}=20 kN/m^3 , φ'=30 degrees. The water table is at 1.5 m below G.L. and the anchor rod is at 1.0 m below G.L. Soil below the dredge level may be assumed to have the same properties as above. 15

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