B.E.(C.E.) Part III fcxam...

6 th Semester Civil Engineering

Soil **Mechanics II**

(CE 603)

Marks: 70 T j 3 Hours

FIRST HALF

Attempt Q. No. 1 and any two from the rest

Figures within parentheses indicate the marks allotted

1. (a) What do you understand by 'the state of plastic equilibrium* in a soil mass ?

(b) A retaining wall with a smooth vertical back has to retain a dry, homogeneous >*ackfi*\\ of *s**Xy* clay up to a height tf. The surface of the backfill is horizontal. The soil has a dry unit weight of y. while its shear parameters are c and ^. Use Rankinc"s *theory* to derive an expression for the active earth pressure intensity at a depth z below the top of the backfill. Hence plot the distribution of active earth pressure on the wall.

(c) Draw the plan and elevation to illustrate the construction of a braced excavation. [2+5+4=11]

2. A gravity retaining wall with a smooth, vertical back *retains* a *horizontal backi*~\\\ up to 4 m above the ground level. The top 2.5 m of the backfill contains a dry sand stratum (v=18.0 kN/m³, y„**i**=18.8 kN/m\ c=0. ^=^'=30°), followed by a stratum of dense sand ()\«r 19.5 kN/m³. c=0, f=32°). The depth of foundation of the wall is 1.2 m below GL and the GWT is located at 1.5 m below the top of the backfill. Draw the distribution of active earth pressure on the wall and determine the magnitude and point of application of the resultant thrust. [12]

3. A masonry retaining wall has to retain a cohesionless backfill up to 3.3 m above the ground level. The wall has a trapezoidal section, with the back face being vertical. The top width and the bottom *width* of the wall are 0.8 m and 2.8 m respectively, while its depth of foundation is 1.0 m. The properties of the backfill, as well as the soil below the base of the wall, are as follows:

y= 18 kN/m\c-0,^=32°

Determine the factors of safety of the wall with respect to sliding and overturning. Hence comment on the adequacy of the given cross-section *of the* wall. [12]

4. A cantilever sheet pile is to be installed to retain a backfill up to 4.5 m above the dredge line. The ground water table is at 1.5 m below the ground level. The properties of the soil are as follows:

Above the dredge level: y=17.5 kN/m³, jw=I 8.5 kN/m³, ^(above GWT) =33°.
f (below GWT>30°

Below dredge level: *y%#=20.0* kN/m ,?„=50 kN/m²

Determine the required depth of embedment of the sheet pile with respect to a factor c safety of 1.5. |K

5. An anchored bulkhead of the dredged type has to retain a cohesionless backfill up height of 6 m above the dredge level. The anchor rod is provided at 1 m below GL. while GWT is located at 2.5 m below GL. The properties of the *so*\\ are given below:

y =18 kN/m³. y_Mr=19 kN/m³. Aboth above and below GWT) =32°

Find the minimum depth of embedment required to keep the bulkhead in equilib Also find the corresponding force in each anchor rod, if their centre-to-centre spacing 1* Use'the fixed earth support method. Given, for ^32°. .v~0.06H. the notations havinf usual meaning.

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SECOND HALF

(Answer **Q.No.6** and any **Two** from the rest)

Q.6. (a) Write short notes on:

(i) Types of slope failure (ii) Function of geotextiles,

(b) Distinguish between:

(i) compaction and consolidation; (ii) Rotary drilling and Auger boring ,

' 2 1 - x 2 ^ + (4 x 2) = 13

Q.7. (a) Discuss the factors that influence the compaction characteristics of soil.

(b) The bulk unit weight and the moisture content of a borrow area are 16.85 kN / m^3 and 12.8 %, respectively. It is intended to construct an embankment of 5 m height and 10 m top width with 1 : 1.5 side slopes and 2 km length with a finished dry unit weight of 19.50 kN / nv\ Specific gravity of soil = 2.67. (i) Determine the quantity of soil required from the borrow pit for construction of 1 m of embankment. (ii) If the construction is to be made with a moisture content of 15.2 %, estimate the amount of water to be added.

(5 + 6 = 11)

Q.8. (a) Enumerate the advantages of reinforced earth wall over other conventional types of retaining walls

(b) Discuss the different basic components of reinforced earth wall.

(c) Describe stepwise the procedure of designing a reinforced earth retaining wall.

(4 + 3 + 4 = 11)

Q. 9. (a) Define Taylor's Stability Number. On which method of slope stability is it based?

(b) A 5 m high embankment has side slopes of 30°. The properties of soil are:

y = 18 kN/m^3, c = 20 kN/m^2, <|>=18^0

Determine the factor of safety of the slope from the following values of the Taylor's Stability Number for a slope angle of 35°:

when <t>=10°, S_n=0.089

when <t.=15°,S_n=0.071

and, when 4>=20°, S_n=0.037

(3 + 8 = 11)

Q.10. (a) Draw a flow chart for planning and execution of a subsurface exploration programme.

(b) What do you mean by stabilized soil ? Give a brief description of Soil - lime stabilization.

(6 + 5 = 11)