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**B.Tech. 6th Semester (Civil Engg.) Examination,  
May-2012**

**GEO TECHNOLOGY**

**Paper - CE-306-F**

*Time allowed : 3 hours]*

*[Maximum marks : 100*

*Note : Attempt any five questions in all. Question No. 1 is compulsory and one question from each section. All questions carry equal marks. Assume any missing data if necessary.*

1. State whether the following statements are true or false :
  - (a) Taylor's stability number is used for stability of slopes.
  - (b) In clay, inclination of a stable slope can be more than the angle of shearing resistance of soil.
  - (c) When a tension crack develops in a slope, the factor of safety is reduced.
  - (d) In Swedish circle method of analysis, the interslice forces are ignored from all sides.
  - (e) The sheeting can be considered to tilt from top.
  - (f) Failure of one of the struts behind bracings would lead to the failure of the entire bracing system.

- (g) The anchors depend on the passive resistance for their stability.
- (h) Resonant frequency should be very high for low speed machines in the design of machine foundations.
- (i) Barkan's value of  $C_u$  for base area is  $10m^2$  or less.
- (j) Blending of admixture reduces Soil Stability.

$$10 \times 2 = 20$$

### Section - A

- 2. (a) Explain the procedure for stability analysis of finite slopes, using method of slices.
- (b) Define the various factors of safety used in the analysis of stability of slopes.
- (c) What are the probable types of failure of a slope?

$$7 + 7 + 6 = 20$$

- 3. (a) Write brief notes on Taylor's stability number.
- (b) A sandy loam backfill has a cohesion of  $12kN/m^2$  and  $\phi = 20^\circ$ . The unit weight is  $17kN/m^3$ . What is the depth of tension cracks?

or

Estimate the critical height of slope in soil where

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for a clay slope of height of  $10\text{m}$ , stability number is  $0.05$ , bulk density is  $20\text{kN/m}^3$  and cohesion is  $25\text{kN/m}^2$ .

$$8+12=20$$

### Section - B

4. (a) In what respect does the design of bracings in cuts vary from that of a retaining wall?
- (b) Draw the apparent earth pressure diagrams recommended by Terzaghi and Peck for cuts in sand, firm clay and soft to medium clay. How is the maximum load calculated in each case?

$$8+12=20$$

5. (a) What is the difference between the anchored sheet piles wall with 'free-earth support' and the, anchored sheet pile wall with 'fixed earth support'.
- (b) What are inter-lock stresses? Explain in detail.
- (c) What is the difference between a bulkhead and cofferdam?
- (d) Discuss the soil pressure in braced cofferdams. Hence explain difference between diaphragm and cellular type of cofferdams with sketch.

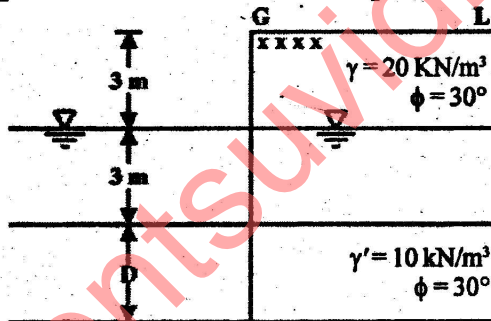
$$6+3+5+6=20$$

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[P.T.O.]

## Section - C

6. (a) What is the purpose of sheet piling in granular soils?
- (b) Deduce an expression for cantilever sheet piling in granular soils.
- (c) Enumerate the design methods of anchored bulk heads in cohesive soils.  $4+8+8=20$
7. For the cantilever sheet pile wall shown below, compute the depth of embedment of sheet pile.  $20$



## Section - D

8. (a) Explain how the process of blending of soil with various constituent materials improves the characteristics of soil.
- (b) What are the main factors which affect the properties of soil-cement and soil-resins in soil stabilization? Give lucid and relevant answer only.

 $8+12=20$ 

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9. (a) Write down the expression for maximum amplitude for the following cases :
- (i) Free vibration without damping
  - (ii) Free vibration with damping
- (b) Determine the natural frequency of a machine foundation in the vertical mode of vibration having plan size 2m square with total weight of 125kN if the coefficient of elastic uniform coefficient is 20,000 kN/m<sup>3</sup>. 6+14=20