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Total No. of Questions : 08

M.Tech.(Soil Mechanics & Foundation Engg.) (2013 & Onwards)

(Sem.–2)

APPLIED SOIL MECHANICS

Subject Code : CESE-04

Paper ID : [E1005]

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT.**
2. **Each question carries TWENTY marks.**

1. a) '*It is often stated that refinements in stability analysis by using different methods is generally not as significant as the correct use of shear parameters of the soil'*. Discuss the validity of the statement.

b) A proposed cutting in a c-ϕ soil will be 15 m deep with a slope of IV:25H. The soil has an average unit weight of 18.6kN/m^3 and an average pore pressure ratio of 0.45. The shear strength parameters of the soil under different conditions are :

$C_u = 85$ kN/m^2, $\phi_u = 0°$

$C' = 12$ kN/m^2, $\phi' = 26°$

Estimate FOS against

i) Immediate shear failure (8)

ii) Long term shear failure (12)

2 a) What do you understand by the mechanism of piping? (8)

b) State some general principles of soil selection in the design and construction of embankments. (12)

3. a) What is soil stabilization? Explain in brief Electrical Methods of soil stabilization. (8)

b) How can the horizontal spacing of reinforcing strips be decided for the material in a retaining wall? (12)

4. a) Explain in detail CAIN's Theory with reference to Arching of soils. (12)

   b) A rigid sewer pipe with on outside diameter of 50 cm is to be laid in a ditch 1 m wide at the top of the pipe and is to be covered with 8.0 m of clayey soil backfill (γ =19 KN/m^3). Determine load on sewer. (8)

5. a) What are the basic approaches used to reduce or prevent the effects of swelling on structures? (10)

   b) Write the procedure to compute Swell Pressure for a given soil sample in the laboratory. What precautions you will take to perform the test? (10)

6. a) Draw an apparent earth pressure diagram for cuts in Dense Sand. (4)

   b) Explain tension crack and critical depth of a vertical cut. (8)

   c) A cut 10 m wide is made up to a depth of 12 m in a uniform deposit of clay having C_u = 0.5 Kg/cm^2, $\phi_\mu = 0°$ and γ = 2.0 t/m^3. Estimate FOS against heave of the bottom if timbering does not extend below the bottom of the cut. (8)

7. a) What is Geo-thermal profile? What are the applications of Geo-thermal Profile? (8)

   b) Define Freezing Index. (4)

   c) Write note on effect of Freezing on coarse grained soil. (8)

8. Discuss the following :

   a) Chemical Stabilization (6)

   b) Bishop's Method (8)

   c) Types of Conduits (6)