Roll No. .....

CE–704

B. E. (Seventh Semester) EXAMINATION, June, 2009

(Civil Engg. Branch)

GEO-TECHNICAL ENGINEERING – I

(CE – 704)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any *five* questions. Assume suitable missing/misprint data if required.

1. (a) What are various methods of determining water content ? Explain oven drying method in detail. 10

   (b) A natural soil deposit has a bulk unit weight of 20·45 kN/m^3 and water content of 6%. Calculate the amount of water required to be added to 1 cubic metre of soil to raise the water content to 15%. Assume the void ratio to remain constant. What will then be the degree of saturation ? Assume G = 2·67. 10

2. (a) Define soil structure and discuss its various types. 10

   (b) What is 'Liquid Limit' ? How is it determined in laboratory ? 10

3. (a) Define flownet. What are the characteristics and uses of flownet ? 10

P. T. O.

(b) Describe the 'Falling Head' permeability test and find an expression : 10

$$k = 2{\cdot}3 \frac{a\,L}{A\,t} \log_{10} \frac{h_1}{h_2}$$

4. (a) Explain the following in detail : 5 each

(i) Liquefaction

(ii) Contact pressure distribution

(b) A 1·25 m layer of soil (G = 2·65 and porosity = 35%) is subjected to an upward seepage head of 1·85 m. What depth of coarse sand would be required above the soil to provide a factor of safety of 2·0 against piping, assuming that the coarse sand has the same porosity and specific gravity as the soil and that there is negligible head loss in the sand. 10

5. (a) Describe 'Direct Shear Test'. What are its limitations ? 10

(b) Explain the stress distribution in soils for concentrated load by Boussinesq's equation. 10

6. (a) Discuss stability of an earth dam under rapid draw-down and steady seepage condition. 10

(b) Explain the method of 'Swedish Slip Circle' to test the stability of slope of C- ϕ soil. 10

7. (a) What are the assumptions in Coulomb's theory ? Compare Rankine's theory and Coulomb's theory of earth pressure. 10

(b) A wall 5·4 m high retains sand. In the loose state the sand has a void ratio of 0·63 and $\phi = 27°$. While in dense state the corresponding values of void ratio and

ϕ are 0·36 and 45° respectively. Compare the ratio of active and passive earth pressure in two cases, assuming G = 2·64. 10

8. Write short notes on any *four* of the following : 5 each
   (i) Three-phase system of soil
   (ii) Arching in soils
   (iii) Vane Shear test
   (iv) Slope failures
   (v) Critical void ratio