Code No. 2364 / N

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II – Semester (New) (Main) Examination, April / May 2013

Subject : Soil Mechanics

Time : 3 hours **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Sketch typical particle size distribution curve for a soil mass having $C_u=C_c=1.0$ and comment on gradation of the soil. 2

2. "Capillary water is free water". Answer yes or no and justify your answer. 2

3. The dry density for any given moisture content on the moisture density curve are always higher than that on "zero Air Voids" line. Answer yes or no and justify your answer. 2

4. Unconfined compression test was performed on three identical specimens of same clay. Draw the typical Mohr's circles corresponding to the three specimen and indicate the failure envelope. Mark the shear parameters. 2

5. Name the type of soil for which the coefficient of active and passive earth pressure are same. 2

6. What is the saturation water content for a soil with G = 3.00 ; e = 1.00 ? 3

7. All other parameters remaining same, what is change in co-efficient of permeability if viscosity and unit weight of the fluid are doubled? 3

8. The time required for a consolidating medium with double drainage to undergo 50% of its primary consolidation settlement was estimated as 10 years. All the conditions remaining same, estimate the time required if the medium has single drainage only. 3

9. In a tri-axial shear test, a sample failed at a deviatoric stress of 180 kPa when the cell pressure was 100 kPa. Determine the magnitude of maximum shear stress induces on any plane and its inclination with Major Principal Plane. 3

10. What is "Depth Factor" of a slope? What is its significance in failure of slope? 3

PART – B (50 Marks)

11.a) Derive the inter-relationship : 5

$$w\ G = e\ Sr$$ with standard notations.

b) The properties of a soil sample include liquid limit = 36%, Plasticity index = 8. The volume at liquid limit ; Plastic limit is 100 cc, 88 cc respectively. If its dry volume is found to be 66 cc, determine shrinkage limit of the soil. 5

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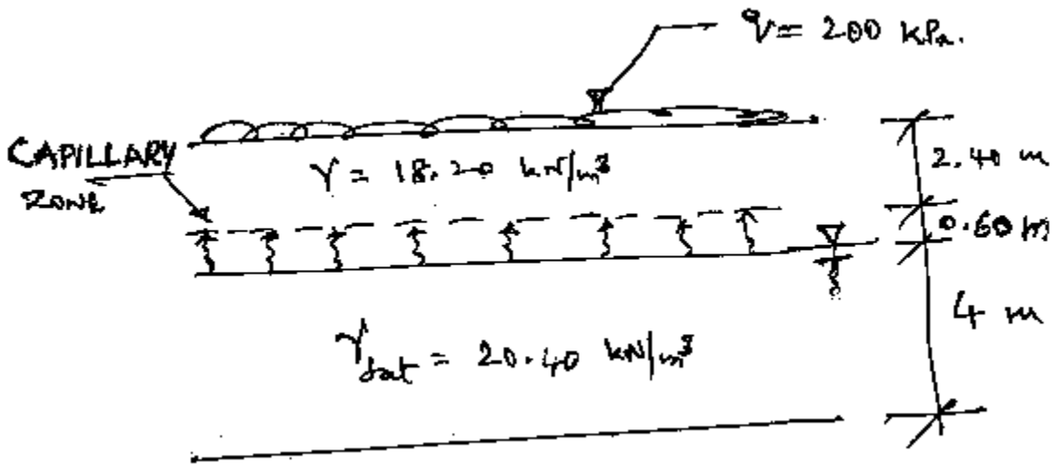
12.a) Write a detailed note on "Plasticity Chart" and its use. 5

b) A soil mass of 500 cc total volume consist of 900 grams of solids and 108 grams of pore water. If its G = 2.70, determine its void ratio, degree of saturation, % air voids, air content. Also determine, the water content at which the soil gets fully saturated without change in its volume and it saturated unit weight. 5

13.a) Explain Capillarity in soils and derive the expression for capillary rise. 5

b) Plot the distribution of effective, neutral and total stress distribution for the soil medium shown below :



14.a) Explain the procedure of vane shear test and derive the expression for shear strength of the soil associated with the test procedure. 5

b) The results of a UU Tri-axial shear test are as given below. Determine the effective shear strength parameters. 5

Confining stress (kPa)	50	100	150
Deviatoric stress (kPa)	180	295	405
Pore water pressure (kPa)	-10	20	50

15.a) A 8m high retaining wall is supporting a c-Φ backfill having c = 40 kN/sqm ; $\Phi = 24^0$; γ = 18.50 kN/cum. Plot the distribution of passive earth pressure and determine the magnitude and point of application of total passive earth pressure acting on the retaining wall. 5

b) Explain "Swedish Slip Circle" method and derive expression for factor of safety of stability of a clay slope. 5

16.a) A flow net consists of 9 flow lines and 16 equi-potential lines. The total head causing flow is 12m. The average size of any field is 0.8m. However, the minimum size of any field at downstream end is 0.6m. The average permeability of soil is given as 3.6×10^{-3} cm/sec. Calculate i) the discharge of seepage flow ii) the exit gradient. 5

b) Explain "field compaction" methods. 5

17. Write a detailed note on any two of the following :
   i) Spring analogy to explain consolidation
   ii) Field compaction quality control
   iii) Capillarity in soils
   iv) Rebhan's graphical solution

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