

the intensities of active and passive earth pressure at depth of 10m in case of dry cohesion less sand and in submersed condition. Give that angle of internal friction is  $30^\circ$ , unit wt. of dry sand is  $20 \text{ kN/m}^3$  and unit wt. of saturated sand is  $22 \text{ kN/m}^3$ . 7

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**CE - 604**

**B.E. VI Semester**

Examination, June 2014

**Geotechnical Engineering - I**

*Time : Three Hours*

*Maximum Marks : 70*

**Note:** Attempt any five questions. Internal choice is given with each question. Assume suitable if any data is found missing or misprint.

1. a) Explain the three phase system of soil mass and establish a relation between  $e$ ,  $G$ ,  $w$  and  $s_r$ . 7
- b) During a proctor's compaction test, weight of the soil sample was 0.019 KN at a moisture content of 17.54%. The proctor's mould was measured to be as 0.104m in diameter and 0.112 meter in height. Find out the void ratio, dry unit weight and degree of saturation. Assume  $G = 2.64$ . 7

OR

2. a) What are the various uses of particle size distribution curve? 3
- b) Explain the sand replacement method of field density determination. 7
- c) Define various limits of plasticity. 4

- b) Write the properties of flow net. 3
- c) An undisturbed sample of a clay stratum 2.5m thick was tested in the laboratory and the average value of coefficient of consolidation was found to be  $2 \times 10^{-4} \text{ cm}^2/\text{sec}$ . If a structure is built on the clay stratum, how long will it take to attain half the ultimate settlement under the load of the structure? Assume double drainage. 4

OR

4. a) Derive the expressions for average permeability coefficient when beddings are parallel and perpendicular. 7
- b) Describe the method square root of time fitting for determination of coefficient of consolidation. 7
5. a) Compare the box shear test and triaxial shear test on the basis of their merits and demerits. 7
- b) Explain the following : 7
- Newmark's influence chart
  - Contact pressure distribution

OR

6. a) Describe vane shear test in detail. 7
- b) Explain the following: 7
- Critical void ratio
  - Liquefaction

7. a) Explain the Swedish slip circle method for finding factor of safety in analysis of C- $\phi$  soil. 6
- b) Discuss the stability of d/s slope of dam during steady seepage and u/s slope during sudden draw down. 8

OR

8. a) Explain the Taylor's stability numbers and stability curves. 8
- b) Calculate the factor of safety with respect to cohesion of a clay slope laid at 1 in 2 to a height of 10m. If the angle of internal friction  $\phi = 10^\circ$ ,  $C = 25 \text{ kN/m}^2$  and  $r = 19 \text{ kN/m}^3$ . What will be the critical height of the slope in this soil. For  $i = 26.5^\circ$  and  $\phi = 10^\circ$ ,  $s_n = 0.064$ . 6

9. a) Derive an expression for total net active earth pressure of cohesive soils using Rankine's theory. 7
- b) A vertical excavation was made in a clay deposit having weight of  $20 \text{ kN/m}^3$ . It caved in after the depth of digging reached 4m. Taking the angle of internal friction to be zero, calculate the value of cohesion. If the same clay is used as a back fill against the retaining wall, up to a height of 8m, Calculate

i) Total active earth pressure

ii) Total passive earth pressure

Assume that the wall yields for enough to allow Rankine's deformation conditions to establish. 7

OR

10. a) Stating various assumptions in Rankine's theory of active earth pressure derive an expression for total active earth pressure per unit length for dry or moist back fill with no surcharge and uniform surcharge. 7