Register Number: ……..

**B.E DEGREE EXAMINATIONS: NOV/DEC 2012**

Fifth Semester

**CIVIL ENGINEERING**

CEE114: Mechanics of Soils

**Time: Three Hours** **Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. The submerged unit weight is given by $\gamma'$ is given by
   a) $\gamma' = \gamma_{sat} - \gamma_w$ b) $\gamma' = \gamma_w - V$
   c) $\gamma' = w_{sub} - V$ d) $\gamma' = w_s - V_s$
2. The particle size distribution of soil particles finer than 75 micron size is determined by
   a) Sieve analysis b) Sedimentation analysis
   c) Hydrometer analysis d) Pycnometer test
3. Water moves in the pores of the soil under the influence of gravity known as
   a) Free water b) Held water
   c) Structural water d) Hygroscopic water
4. The Phenomenon of increase in volume of sand due to dampness is known as
   a) Capillary Syphoning b) Swelling of soil
   c) Bulking of sand d) Slaking
5. Pore water Pressure is also known as
   a) Effective Pressure b) Hydrostatic Pressure
   c) Soil Pressure d) Neutral Pressure
6. Boussinesq Solution assumes that soil deposit is
   a) Isotropic b) Anisotropic
   c) Compressible d) Incompressible
7. According to Mohr,the shear failure of soil is caused by a critical combination of the
   a) Friction and shear stress b) Normal and shear stress
   c) Cohesion and Normal stress d) Principal Stress
8. Which of the following test is used to measure the shear strength of a soil
   a) Unrestrained swell test b) Triaxial Compression test
   c) Stabilisation test d) Sieve analysis
9. The slope failure occurs along an inclined plane is known as
   a) Wedge failure b) Rotational failure
   c) Translation failure d) Compound failure

10. The Stability number can be used to determine the

a) Shear strength b) Friction

c) Factor of safety d) Cohesive force

**PART B (10 x 2 = 20 Marks)**

11. Difference between void ratio and porosity.
12. Define the terms liquid limit and plastic limit?
13. Define Darcy's law.
14. What are the uses of flow net?
15. Define Effective stress.
16. What do you mean by Compressibility of soil?
17. Write any two important characteristics of Mohr's circle.
18. What is Stress path?
19. How to improve stability of slopes?
20. What are the assumptions that are generally made in the analysis of the stability of slopes.

**PART C (5 x 14 = 70 Marks)**

21. a) A moist soil sample weighs 3.52 N. After drying in an oven,its weight is reduced to 2.9 N.The specific gravity of solids and the mass specific gravity are,respectively,2.65 and1.85.Determine the water content, void ratio, porosity and the degree of saturation. Take $\gamma_w = 10\ kN/\mathrm{m}^3$.

**(OR)**

b) A test for the relative density of soil in place was performed by digging a small hole in the soil.The volume of the hole was 400 ml and the moist weight of the excavated soil was 9N.After oven drying,the weight was 7.8 N.Of the dried soil,4N was poured in to a vessel in a very loose state, and its volume was found to be 270 ml.The same weight of soil when vibrated and tamped had a volume of 200 ml.Determine the relative density.

22. a) (i) The capillary rise in silt is 50 cm and that in fine sand is 30 cm.What is the difference in the pore size of the two soils? (7)

(ii) Explain Quick Sand Condition. (7)

**(OR)**

b) A sand deposit is 10 m thick and overlies a bed of soft clay. The ground water table is 3 m below the ground surface. If the sand above the ground water table has a degree of saturation of 45%, plot the diagram showing the variation of the total stress, pore water pressure and the effective stress. The void ratio of the sand is 0.70.Take G = 2.65.

23. a) Discuss the basis of the construction of Newmarks Influence chart.How it is used.

**(OR)**

b) A clay layer 4 m thick is subjected to a pressure of 55 kN/$m^2$.If the layer has a double drainage and undergoes 50% consolidation in one year, determine the coefficient of consolidation. Take $T_v$ = 0.196.

24. a) Derive a relationship between the Principal Stresses at failure using Mohr-Coulomb failure Criterion.

**(OR)**

b) A shear vane of 7.5 cm diameter and 11.0 cm length was used to measure the shear strength of a soft clay.If a torque of 600 N-m was required to shear the soil,calculate the shear strength. The vane was then rotated rapidly to cause remoulding of the soil.The torque required in the remoulded state was 200 N-m.Determine the sensitivity of soil.

25. a) A vertical cut is made through a homogenous soil mass ( c = 20 kN/$m^2$,$\varphi = 20^\circ$, $\gamma$ = 16.5 kN/$m^3$).Using Culmann's method,(a) Determine the safe depth of the cut,taking a factor of safety of 2.0.(b) Also determine the safe depth using stability charts.

**(OR)**

b) Discuss the friction circle Method for the stability analysis of slopes.

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