KUMARAGURU
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Register Number: ……..

B.E DEGREE EXAMINATIONS: MAY 2015

(Regulation 2009)

Fourth 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. Dry unit weight of soil is
   a) Total weight of soil/ volume of solids
   b) Weight of dry soil/ volume of dry soil
   c) Weight of solids/ volume of solids
   d) Weight of solids / total volume
2. Liquid limit minus plastic limit is equal to
   a) Consistency index
   b) Liquidity index
   c) Plasticity index
   d) Toughness index
3. At a particular level in a soil stratum when the water table rises
   a) Both effective stress and total stress decreases
   b) Both effective stress and total stress increases
   c) Effective stress decreases but total stress increases
   d) Effective stress increases but total stress decreases
4. In a flownet the discharge is inversely proportional to
   a) Coefficient of permeability
   b) Head causing the flow
   c) Number of equipotential drops
   d) Number of flow channels
5. Newmark's influence chart is used to determine the vertical stress under a uniformly loaded area of
   a) Annular space between two consecutive circles
   b) Any shape
   c) Circular shape
   d) Rectangular shape
6. If the ultimate settlement of a layer is 50mm with one way drainage, then the ultimate settlement of the same layer with two way drainage is
   a) 100mm
   b) 50mm

c) 25mm d) 12.5mm

7. In a direct shear test the angle made by the failure plane with respect to horizontal plane is ---- (φ is angle of internal friction)

a) 0^o b) $45^o - \varphi/2$

c) $45^o + \varphi/2$ d) 90^o

8. Vane shear test is applicable for

a) Dense sand b) Loose sand

c) Soft clay d) Stiff clay

9. An infinite slope made up of c – φsoil has its slope equal to φ. The stability number is

a) 0 b) 0.181

c) 1 d) Infinity

10. The factor of safety with respect to cohesion of embankment of height 6m is 1.5. The critical height of embankment is

a) 4m b) 6m

c) 9m d) 12m

PART B (10 x 2 = 20 Marks)

11. Define: Atterberg limits
12. Sketch the phase diagram for soil and indicate the volumes and weights of the phase on it.
13. What is meant by total, neutral and effective stress of soil?
14. What is Darcy's law?
15. Differentiate between compaction and consolidation
16. State the assumptions made in Terzaghi's theory of one dimensional consolidation
17. What are the advantages of direct shear test?
18. Why tri axial shear test is considered superior than direct shear test?
19. List the methods used to find stability of slopes
20. Discuss about the uses of stability number

PART C (5 x 14 = 70 Marks)

21. a) (i) A soil has a mass specific gravity of 1.90, specific gravity of solids 2.70 and moisture content 30%. Find the values of void ratio, porosity and degree of saturation. (9)

(ii) Explain how the liquid limit is determined in the laboratory? (5)

(OR)

b) (i) What are the various methods of soil classification? Describe briefly the BIS soil classification system (7)

(ii) Describe the standard penetration test procedure. State the factors affecting compaction. (7)

22. a) (i) A soil deposit consists of fine sand to a depth of 15m. The average void ratio is 0.8. The water table is at a depth of 5m below the ground surface. The degree of saturation of sand below the water table is 50%. Calculate the effective pressure on a horizontal plane at a depth of 12m below the ground surface. Assume G = 2.85 (9)

(ii) What is permeability? State the variables on which the permeability of a given soil depends (5)

(OR)

b) (i) A sample of coarse sand is 15cm high and 10cm in diameter. It was tested in constant permeameter. Water flows through the soil under hydrostatic head of 75cm for 5 seconds. The water was collected and found to weigh 1300gm. Find out the coefficient of permeability. (7)

(ii) Describe a method of plotting flownet. State the characteristics of flownet. (7)

23. a) (i) Explain the procedure of determination of effective stress by Newmark's chart method. (7)

(ii) State the assumptions implied in the use of Boussinesq's theory to determine the vertical stress in soil due to a point load. (7)

(OR)

b) (i) What do you understand by the terms: immediate settlement, primary consolidation and secondary consolidation? (6)

(ii) Explain the Terzaghi's one dimensional consolidation theory of soils (8)

24. a) (i) State the widely used methods used in laboratory for the measurement of shear strength of soils (7)

(ii) Describe briefly the direct shear test at un drained condition (7)

(OR)

b) (i) Describe the test procedure of tri axial shear test and explain the practical significance of the test (7)

(ii) A cylinder of soil fails under an axial vertical stress of 140kN/m^2 when it is laterally confined. The failure plane extends in an angle of 48^o with the horizontal. Calculate the values of cohesion and the angle of internal friction. (7)

25. a) (i) State the assumptions made in slope stability analysis. (7)

(ii) Describe briefly the modified Bishop's method for the stability analysis of slopes (7)

(OR)

b) (i) What is Taylor's stability number? How do you use the stability chart? (7)

(ii) Explain the Sweedish circle method of analysis for c – φ soil. (7)

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