KATHMANDU UNIVERSITY
End-Semester Examination
February/March, 2018

Marks Scored:

Level : B.E.
Year : III

Course : CIEG 303
Semester: I

Exam Roll No.: Time: 30 mins. F.M. : 10

Registration No.: Date MAR 05 2018

SECTION "A"
[20 Q.×0.5=10 marks]

Mark " √ " in the appropriate box.

1. When the products of rock weathering are not transported but remain in-situ, the soil is termed as _____.
   a. alluvial soil b. colluvial soil c. aeolian soil d. residual soil

2. The coefficient of curvature of a well-graded soil should be _____.
   a. less than 1 b. more than 4
   c. in between 1 and 3 d. in between 0 and 0.5

3. Plot of soil above A-line plasticity chart is classified as _____.
   a. peat b. organic clay c. silt d. clay

4. A soil sample contains void ratio 0.85 and specific gravity of 2.75. The water content required to fully saturate at this void ratio will be _____.
   a. 42% b. 31% c. 38% d. 63%

5. A flow net is used to determine _____.
   a. seepage and coefficient of permeability only
   b. coefficient of permeability and exit gradient only
   c. seepage and exit gradient only
   d. seepage, exit gradient and uplift pressure

6. The effective stress is _____.
   a. an abstract quantity b. equal to total stress
   c. principal stress d. actual contact stress

7. The inclination of the failure plane behind the vertical retaining wall in active state is inclined to the horizontal at an angle of _____.
   a. $45°+\phi'/2$ b. $45°-\phi'/2$ c. $45°+\phi'$ d. $45°-\phi'$

8. Consolidation time of a soil specimen _____.
   a. decreases with a decrease in permeability
   b. increases with a decreases in permeability
   c. increases with an increase in permeability
   d. increases with a decrease in unit weight of water.

9. When drainage is allowed in a tri-axial test, the test is termed as _____.

a. rapid test
b. undrained test
c. drained test
d. consolidation undrained test

10. The total normal stress is 500 kN/m^2 and the pore water pressure is 200 kN/m^2. The effective stress shear strength parameters for the soils are $c' = 20$ kN/m^2 and $\phi' = 30°$. The shear strength in terms of effective stress on a plane within a saturated soil mass at a point is _____.

a. 195 kN/m^2
b. 193 kN/m^2
c. 206 kN/m^2
d. 308 kN/m^2

11. The active earth pressure caused by a cohesionless backfill on a smooth vertical retaining wall may be reduced by _____.

a. compacting the backfill
b. providing a surcharge load on the backfill
c. saturating the backfill with water
d. providing a surcharge load and saturating the backfill with water

12. Crib wall consists of _____.

a. self-weight to support the backfill
b. much thinner stem to provide most of the resistance to sliding and overturning
c. thin vertical concrete webs at regular intervals along the backside of the wall
d. precast concrete members linked together to form a crib

13. Identify the incorrect statement. The stability of a slope is decreased by _____.

a. removal of a part of slope by excavation
b. shock caused by an earthquake
c. pore water pressure in the soil
d. providing a berm at the toe

14. In stability analysis, the term mobilized shear strength is referred to as _____.

a. shear strength
b. maximum shear strength
c. applied shear stress
d. minimum shear strength

15. The shear strength of a soil is _____.

a. directly proportional to the angle of internal friction of soil
b. indirectly proportional to the angle of internal friction of soil
c. decreases with increases in normal stress
d. decreases with decreases in normal stress

16. The angle that Coulomb's failure envelope makes with the horizontal is called_____.
    a. angle of internal friction
    b. angle of repose
    c. cohesion
    d. dilatancy

17. The term 'intact rock' refers to _____.
    a. the rock material within the framework of discontinuities
    b. in-situ rock together with its discontinuities
    c. in-situ rock together with its discontinuities and weathering profile
    d. discontinuities together with different types of rocks

18. The RQD value in a tunnel alignment is determined to be 50-75% which indicates the rock mass quality as _____.
    a. very good quality
    b. fair
    c. excellent
    d. very poor

19. Rock slope stability is assessed with the aid of _____.
    a. Schmidt Stereo Net
    b. Rose Diagram
    c. Wulff Stereo Net
    d. Bar Diagram

20. In a stereographic analysis, plane failure can be identified if _____.
    a. planar feature dip opposite to hill/cut slope with hill/cut slope at least 55°
    b. intersections of any two or more discontinuities occur
    c. joints, beddings or foliation is at same direction with the direction of slope (± 20°) and daylight the slope face
    d. wedge with close slope direction (up to 32°)

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SECTION "B"

ATTEMPT ALL QUESTIONS:

1. If a soil consists of sand and fines, would drying the soil in the oven and then sieving it through a standard stack of sieves give accurate results on the fines content? Justify your answer. A soil specimen consists 20% of water content and a wet unit weight of 20 kN/m^3. If the specific gravity of solids is 2.65, determine the dry unit weight, void ratio and the degree of saturation. Assume unit weight of water is 10 kN/m^3. [5]

2. Define permeability in a soil medium. Describe the permeability in a stratified layer. Discuss the variation of coefficient of permeability for granular soils. [5]

OR

Define equipotential line and flow line. Describe the different methods used to construct the flow net. [5]

3. Illustrate determination of shear strength parameters during the consolidation undrained, consolidation drained and unconsolidated undrained tests. The effective stress shear strength parameters of a soil are: $c' = 50$ kPa and $\phi' = 35°$. Determine the shearing resistance on a plane within a submerged soil mass where the total normal stress is 425 kPa and the pore water pressure is 205 kPa. [5]

4. State the assumptions of time rate of consolidation derived by Terzaghi. Discuss the Taylor's method of determining coefficient of consolidation. [5]

5. Enlist the assumptions of Rankine's theory of earth pressure. Describe the expressions for active and passive earth pressures with the aid of Rankine's theory. [5]

6. A retaining wall with a smooth vertical back is 5 m high and retains a two-layer sand backfill with the following parameters as shown fig. 1 in the diagram. Determine the active earth pressure distribution at the top, boundary and at the bottom of the layer. Assume that the water table is situated below the base of the wall. [5]

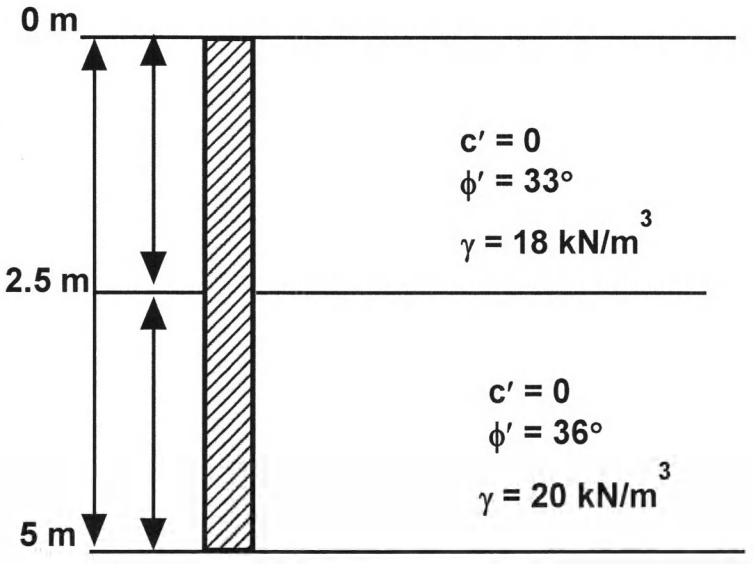

Fig. 1

7. Describe the methods controlling of landslides. A translational soil slide is observed at the site of horticultural farm. The bulk unit weight of soil is determined to be 1.8 t/m^3 and angle of internal friction determined in the laboratory shear test is 36°. The depth of the slide is identified as 1.3 m and the angle of landslide profile is measured to be 37°. Determine the stability number of the given landslide. Assume unit weight of water is 10kN/m^3. [5]

8. Define tunneling quality index. Discuss the rock mass classification and its application in engineering field with suitable examples. Illustrate with suitable examples in order to interpret stability analyses of rock with the use of stereographic analyses of rock. [5]