KATHMANDU UNIVERSITY
End-Semester Examination
February/March, 2019

Marks Scored:

Level : B.E.
Year : III

Course : CIEG 303
Semester: I

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

Registration No.: Date FEB 2 0 2019

SECTION "A"
[20 Q. × 0.5 =10 marks]

Encircle the most of appropriate answer.

1. The internal molecular attraction of a soil, the cohesion_____.
   a. depends upon the external applied load.
   b. is more in well compacted clays.
   c. increases as the moisture content decreases.
   d. decreases as the moisture content increases.

2. Accurate determination of water content, is made by_____.
   a. alcohol method
   b. oven-drying method
   c. sand bath method
   d. calcium carbide method

3. When drainage is permitted under initially applied normal stress only and full primarily consolidation is allowed to take place, the test is known as_____.
   a. drained test
   b. quick test
   c. consolidated undrained test
   d. none of these

4. Swelling clay group when water enters into it is _____.
   a. Kaolinite group
   b. Vermiculite group
   c. Mite group
   d. Montrorillonite group

5. The minimum water content at which the soil just begins to crumble when rolled into threads of 3 mm in diameter, is known at the state of _____.
   a. permeability limit
   b. shrinkage limit
   c. liquid limit
   d. plastic limit

6. The O.C.R. of an over consolidated clay is_____.
   a. more than 1
   b. equal to 1
   c. less than 1
   d. approximately 1.5

7. Degree of saturation of a natural soil deposit having water content 15%, specific gravity 2.50 and void ratio 0.5, is_____.
   a. 60% b. 58% c. 80% d. 75%

8. The seepage force in a soil, is _____.
   a. inversely proportional to the exit gradient
   b. proportional to the exit gradient
   c. parallel to the head loss
   d. perpendicular to the equipotential lines

9. The coefficient of compressibility of soil, is the ratio of_____.
   a. stress to strain
   b. strain to stress
   c. stress to settlement
   d. rate of loading to that of settlement.

10. In a liquid limit test, the moisture content at 10 blows was 70% and that at 100 blows was 20%. The liquid limit of the soil, is _____.
a. 65% b. 75% c. 40% d. 35%

11. If the failure of a finite slope occurs through the toe, it is known as_____.
a. slope failure b. toe failure c. base failure d. embankment failure

12. The ratio of settlement at any time 't' to the final settlement, is known as_____.
a. consolidation of undisturbed soil b. degree of consolidation
c. coefficient of consolidation d. compressibility index

13. The angle between the directions of the failure and the major principal plane, is equal to _____.
a. $45°+\phi'/2$ b. $45°-\phi'/2$ c. $45°+\phi'$ d. $45°-\phi'$

14. Rankine's pressure of earth pressure assumes that the back of the wall is _____.
a. plane and smooth b. plane and rough
c. vertical and smooth d. vertical and rough

15. When the seepage pressure becomes equal to the pressure due to submerged weight of a soil, the effective pressure is reduced to zero and the soil particles have a tendency to move up in the direction of flow. This phenomenon is generally known _____.
a. quick condition b. boiling condition
c. quick sand d. all the above

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

17. The term 'rock mass' refers to _____.
a. the rock material within the framework of discontinuities
b. a large and indistinct body of solid earth materials, containing features on the scale of jointing, folding, schistosity, etc.
c. in-situ rock together without its discontinuities and weathering profile
d. single type of rock having no fractures

18. The RQD value of 75-90% indicates the rock mass quality as _____.
a. good quality b. fair c. excellent d. very poor

19. Kinematic failures of rocks are determined using _____.
a. Rose Diagram b. Schmidt Stereo Net
c. Wulff Stereo Net d. Bar Diagram

20. Wedge failure will be occurred in the stereonet analysis when _____.
a. planar feature dip opposite to hill/cut slope with hill/cut slope at least 55°
b. intersections of any two or more discontinuities and daylight the slope
c. joints, beddings or foliation is at same direction with the direction of slope and daylight the slope face ($\pm 20°$)
d. wedge with opposite to slope direction

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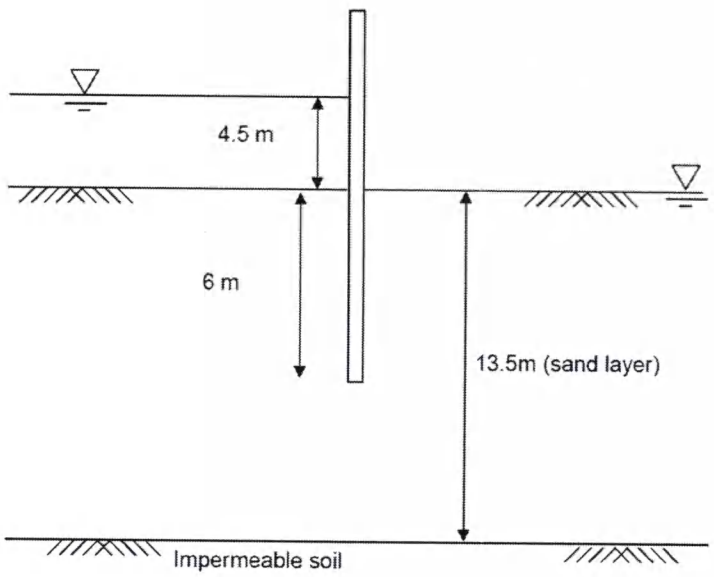
F.M. : 40

SECTION "B"

Attempt *ALL* questions.

1. The mass of a moist soil sample collected from the site is 500 g, and its oven dry mass is 498.5 grams. The specific gravity of the soil solids was determined in the laboratory to be 2.67. If the void ratio of the soil in the natural state is 0.8, determine the moist density, dry density of the soil in the field in kg/m^3 and the mass of water, in kilograms, to be added per cubic meter of soil in the field for saturation. [5]

2. Describe the geometrical properties of flow net. A sheet pile wall is driven to a depth of 6 m into a permeable sand layer (k = 6.10^{-3} mm/s) of 13.5 m thickness lying on an impermeable layer. The water on one side of the wall is at a height of 4.5m, while on the other side, pumps maintain the water level at ground level. To design the pumping system, draw, by hand, the flow net and estimate the flow under the wall in m^3/day. [5]



3. Discuss the practical applications of CD test from tri-axial tests with suitable examples. A series of drained tri-axial tests were performed on specimens of a sand prepared at the same porosity and the following results were obtained at failures. Determine the value of the angle of shearing resistance ϕ'.

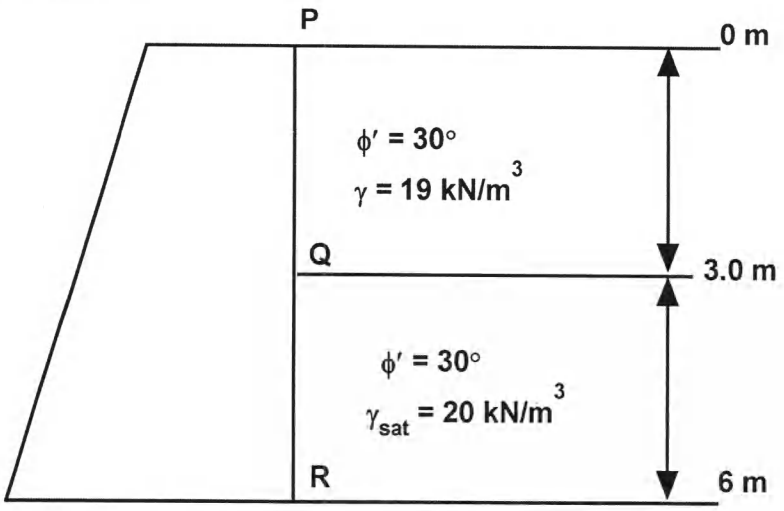
All round pressure (kN/m^2)	100	200	400
Principal stress difference (kN/m^2)	450	910	1810

[5]

4. Discuss the spring cylinder model to describe the process of consolidation. Describe the process of determination of pre-consolidation pressure through an appropriate diagram. [5]

5. Describe the expressions for Coulomb's active earth pressures in cohesionless soil. [5]

6. Determine the lateral earth pressure at rest per unit length of the wall shown below in the diagram. Also determine the location of the resultant earth pressure. Given: $K_0 = 1\text{-}\sin\phi'$ and $\gamma_w = 10\ kN/m^3$. [5]



7. Deduce the equation for the stability analysis of an infinite slope in cohesionless soil. A translational soil slide is observed in Daman, Central Nepal. The bulk unit weight of soil is determined to be 2.0 t/m^3 and angle of internal friction determined in the laboratory shear test is 30°. The depth of the slide is identified as 2.0 m and the profile of the slide is 32°. Estimate the stability number of the given landslide assuming unit weight of water as 9.8 kN/m^3. [5]

8. Define intact rock and rock mass. Discuss the geomechanical classification and Q-system in detail. Interpret different types of kinematic failures of rock using stereographic projection. [5]