

KATHMANDU UNIVERSITY
End Semester Examination [C]
April/May, 2023

Marks Scored:

Level : B.E.

Year : III

Exam Roll No. :

Time: 30 mins.

Course : CIEG 303

Semester : I

F. M. : 10

Registration No.:

Date : 3. May - 023

SECTION "A"

[20Q. \times 0.5 = 10 marks]

Encircle the most appropriate option.

- The rock fragments produced by transportation of wind is called _____.
a. alluvial soil b. colluvial soil c. aeolian soil d. residual soil
- The value of coefficient of curvature of a poorly-graded soil should be _____.
a. less than 1 b. in between 1 and 3
c. more than 4 d. in between 0 and 0.5
- When drainage is not permitted under initially applied normal stress only and full primary consolidation is allowed to take place, the test is known as _____.
a. consolidated undrained test b. consolidated drained test
c. unconsolidated undrained test d. unconsolidated undrained test
- A cohesive soil sample was taken from an SPT and returned to the laboratory in a glass jar and the mass of the sample was 140.5 gm. The sample was then placed in a container of volume of 500 cm³ and 423 cm³ of water was added to fill the container. What was the unit weight of soil in kN/m³?
a. 17.9 b. 20 c. 21.5 d. 19.5
- What is the value of low plasticity limit?
a. > 80% b. 70% - 80% c. 50% - 70% d. < 50%
- Slurry pile wall _____.
a. vertical wide flange steel members with horizontal timber lagging
b. cylinder or box filled with rocks, concrete
c. precast concrete members linked together to form a crib
d. cast-in-place concrete walls built using bentonite slurry
- The internal molecular attraction of a soil, the cohesion _____.
a. is more in well compacted clays
b. depends upon the external applied load
c. increases as the moisture content decreases
d. decreases as the moisture content increases
- The O.C.R. of an over consolidated clay is _____.
a. approximately 1.5 b. equal to 1
c. less than 1 d. more than 1
- The seepage force in a soil is _____.
a. inversely proportional to the exit gradient
b. inversely proportional to the exit gradient
c. parallel to the head loss
d. perpendicular to the equipotential lines

10. The ratio of settlement at any time 't' to the final settlement, is known as _____.
- consolidation of undisturbed soil
 - degree of consolidation
 - coefficient of consolidation
 - compressibility index
11. The stability of a slope is increased by _____.
- shock caused by an earthquake
 - decreasing pore water pressure installing proper drainage paths
 - increasing pore water pressure in the soil
 - cutting of the toe
12. The normal stress is _____.
- an abstract quantity
 - equal to total stress
 - principal stress
 - actual contact stress
13. The coefficient of active earth pressure is _____.
- $1 - \tan\phi' / 1 + \tan\phi'$
 - $1 + \sin\phi' / 1 - \sin\phi'$
 - $1 - \sin\phi' / 1 + \sin\phi'$
 - $1 + \tan\phi' / 1 - \tan\phi'$
14. The seepage force in a soil, is _____.
- inversely proportional to the exit gradient
 - inversely proportional to the exit gradient
 - perpendicular to the equipotential lines
 - parallel to the head loss
15. The angle that Coulomb's failure envelope makes with the horizontal is called _____.
- cohesion
 - angle of internal friction
 - dilatancy
 - angle of repose
16. The term 'rock mass' refers to _____.
- in-situ rock together without its discontinuities and fractures
 - the rock material with its discontinuities and fractures
 - a large and indistinct massive body
 - the rock material without having weathering profiles
17. If the RQD value in a tunnel alignment is found to be 75-90%, what should be the rock mass quality?
- good
 - very good quality
 - fair
 - excellent
18. The coefficient of passive earth pressure is _____.
- $1 - \tan\phi' / 1 + \tan\phi'$
 - $1 + \sin\phi' / 1 - \sin\phi'$
 - $1 - \sin\phi' / 1 + \sin\phi'$
 - $1 + \tan\phi' / 1 - \tan\phi'$
19. Which of the following conditions need to fulfil for the plane failure to be occurred?
- joints, beddings or foliation is at same direction with the direction of slope ($\pm 20^\circ$) and daylight the slope face
 - planar feature dip opposite to hill/cut slope with hill/cut slope at least 55°
 - intersections of any two or more discontinuities
 - wedge with close slope direction (up to 32°)
20. The equal-angle projection _____.
- preserves the angular relationships
 - preserves the area
 - represents with the help of rose diagram
 - represents the data in Schmidt stereo net

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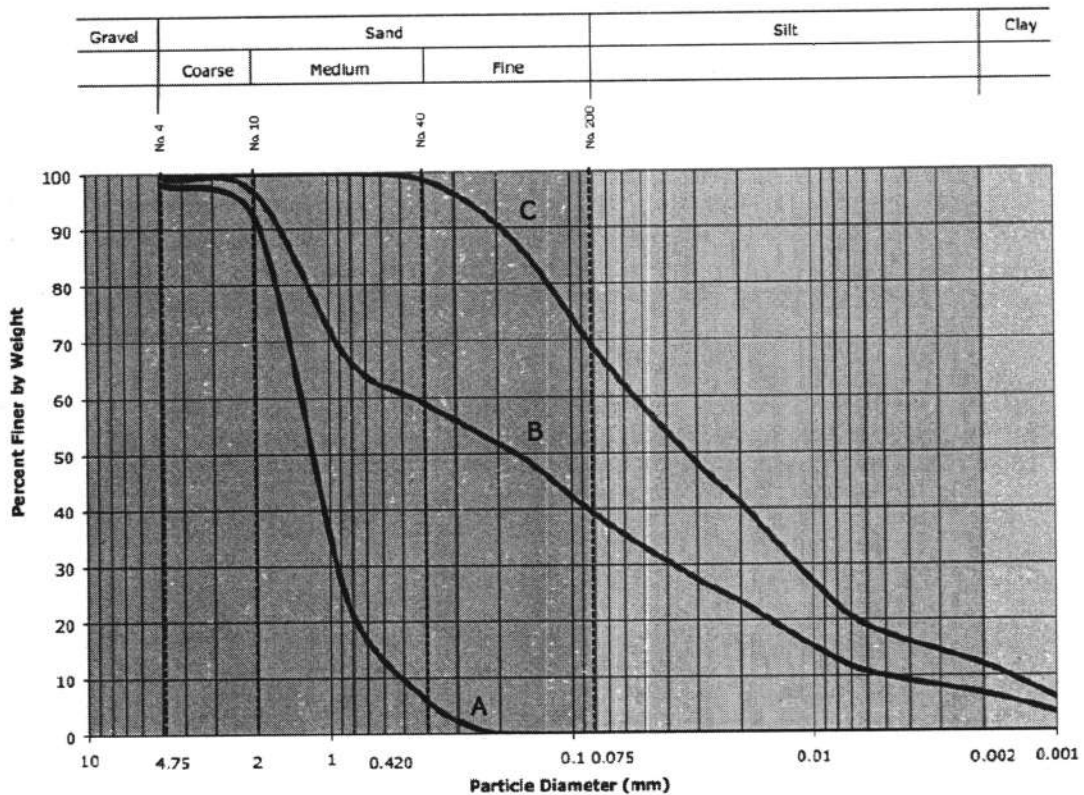
03. May
Course : CIEG 303
Semester : I
F.M. : 40

Level : B.E.
Year : III
Time : 2 hrs. 30 mins.

SECTION "B"
[8Q. × 5 = 40 marks]

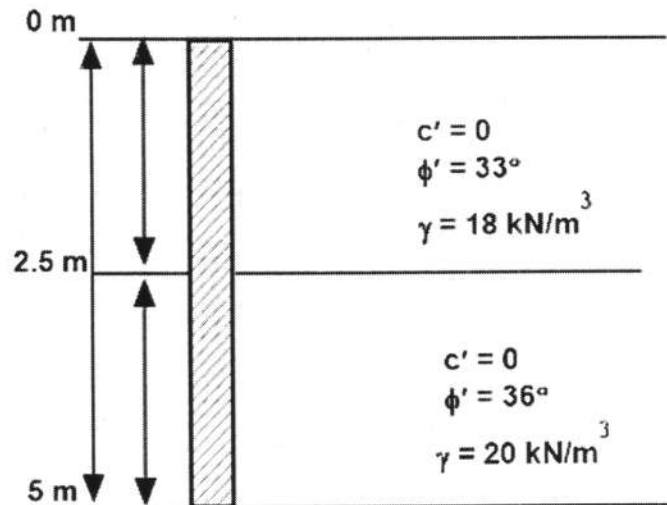
Attempt ALL questions.

1. Write down one specific problem of swelling clay with an example. Write down the properties of equipotential line and flow line. Use the grain size distribution curve shown below to classify soils A and B using USCS. Soil B's Atterberg Limits are, LL = 49% and PL = 45%. [1+1+3]



2. Define effective stress of a soil. A soil particle is found to be subjected to a maximum stress of 14.6 kN/m^2 , and a minimum stress of -4.18 kN/m^2 . Find the σ_θ and τ_θ on the plane of $\theta = 50^\circ$ with respect of the major principal stress, and also find τ_{\max} . [1+4]
3. Determine the equation for the factor of safety of infinite slope using Coulomb's law. 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 angle of landslide profile is measured to be 43° . Determine the stability number of the given landslide. Assume unit weight of water is 10 kN/m^3 . [2+3]
4. Describe the procedure to determine pre-consolidation pressure with a suitable diagram. Discuss the normally consolidated soil and over consolidated soil with appropriate equation. [2.5+2.5]

5. 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 below 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. [2.5+2.5]



6. Differentiate between intact rock and rock mass. Describe the rock mass classification in detail with suitable example from Nepal Himalaya. [2+3]
7. Differentiate between (ANY TWO). [2Q. \times 2.5 = 5]
- Active earth pressure and passive earth pressure
 - Over consolidated soil and normally consolidated soil
 - Plane failure and Wedge failure
8. Write Short Notes on (ANY TWO). [2Q. \times 2.5 = 5]
- Types of hemispherical projection
 - Stratified permeability
 - Direct shear test of soil